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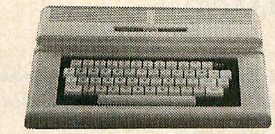

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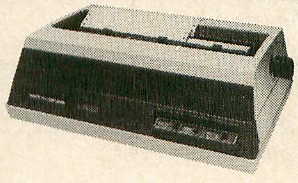

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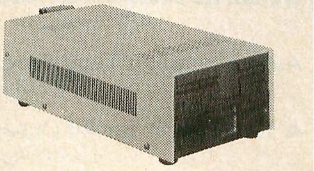

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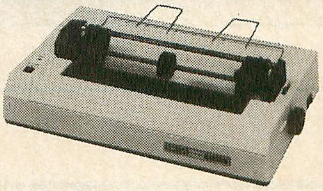

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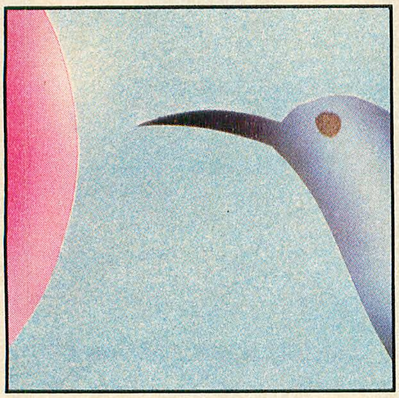

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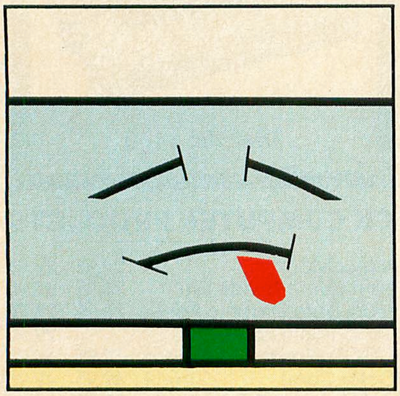

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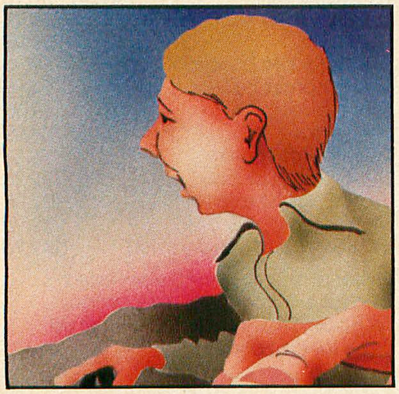

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📼 The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 161.

NEXT MONTH: The CoCo really gets down to business, as March is our Business and Finance issue. We will feature a wealth of business applications for the CoCo for use in the home and small businesses. It won't be all work and no play, however, as we will also include the usual mix of games, graphics and music programs for the beginner. An investment tip: Look for THE RAINBOW for the best articles, programs and product reviews for your Color Computer.

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February 1986 Vol. V No. 7

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LETTERS TO THE RAINBOW

Obsolescence Prevention Invention

Editor:

Last week I was in a Walden Bookstore and noticed a computer magazine with an article on the new Amiga coming out by Commodore. It has the ability to run three programs at the same time. I have a 64K CoCo, which I bought in October 1984. Seeing this ability to run three programs at the same time for only $1,295 really made me envious. It made me realize how fast computers improve.

I really like my CoCo, and I am starting to understand it better and get a lot out of it. I had a lot of disappointments at first because I didn't understand what was going on, but now I really look forward to doing all sorts of projects and business with it. There isn't any reason why someone couldn't invent some kind of program pack or side-port attachment that would make the CoCo capable of doing the same thing the Amiga does, probably even better and cheaper. A program pack is basically added memory with a program included, so there isn't any reason why someone could not invent a port attachment that makes the CoCo capable of running three or even 10 programs all at once.

I don't want my CoCo and my investment to become obsolete. If anybody has thought of this idea already, they can get their imagination zapped enough to work on it. I'm sure a lot of CoCo owners will be grateful.

Thomas F. Heiliger
San Diego, CA

Changes are Coming

Editor:

For some time now the CoCo has been overlooked by many major software companies that produce versions of their programs for almost every other system except ours.

Things may be changing. If you look on the package of Infocom's Adventure, *The Hitchhiker's Guide to the Galaxy*, based on the book by Douglas Adams, you'll see it has a version available for the Color Computer. I do not know where this version can be found, but I have heard Radio Shack will be distributing it, much like they did with *Zork* for the Model III.

If anyone can confirm this, please write in.

Allen Huffman
Broaddus, TX

Editor's Note: Did you see Infocom's ad on pages 10 and 11 of our December 1985 issue? Infocom's free number is 1 (800) 262-6868. Or, write to them at 125 Cambridge Park Drive, Cambridge, MA 02140.

HINTS AND TIPS

Editor:

I enjoyed the *CoCocad* program by Peter Kerckhoff in the October 1985 issue, Page 131.

To use Listing 2, *Cadprint*, with an Epson printer, Line 30 must be changed to:

```
30 PRINT#-2,CHR$(27);CHR$(51);
CHR$(24)
```

This correctly adjusts paper feed.

I have modified Bill Nolan's *Disk Database Manager*, December 1984, Page 256, to file Radio DX'ers radio logs. Program changes are available to interested readers. Write me at 107 Balsam Street, 54479.

Ronald G. Draeger
Spencer, WI

Shown in Actual Size

Editor:

I have noticed on several different occasions some CoCo nuts have requested a screen dump for the DMP-110. Most screen dumps give a condensed version of the screen. I have used Radio Shack's *BWDUMP* with my DMP-110, but I send a `PRINT#-2,CHR$(27);CHR$(14)` to the printer first, before loading the program. This puts the printer in the elongation mode and I get full-sized printouts every time.

Tony Sciacca
Gretna, LA

Ribbon Flip

Editor:

Even though the Okidata ML92 ribbons are about the least expensive of any, don't just toss that old one away. Turn it *over.* The Okidata print head only uses a small band of the ribbon, so turning it over will double the print capacity with no mess involved (unlike re-inking).

John McCormick
Mahaffey, PA

The Glamorous Life

Editor:

I have discovered the notes of Sheila E. by typing and listening to the keys on my CoCo 2. I would like to share with other CoCo owners the musical notes of Sheila E.'s "Glamorous Life."

```
1 PLAY"L8;11;7;7;9;9;2;2;4;4;7;L8;
9;P8;L8;11;11;7;7;9;9;2;2;4;P4P8;
4;P8;11;9;7;P8;11;9;7;o5;c"
```

Run it and enjoy!

Sean Walters
Bronx, NY

Electronic Book Talk

Editor:

In the November 1985 issue [Page 30], I found, to my delight, information for Radio Shack's new Electronic Book. After running the programs, I found that some of the responses on the pads did not work, so I checked the 'X' and 'Y' coordinate values of my book and found half to be different from the values used in the program. After editing the program values, all went well.

Perhaps my experience can save others time and frustration. I suggest that the 'X' and 'Y' coordinate values be checked before entering the programs. I used the joystick program in the reference book, and corrected the numbers in the article.

I am very glad to see that someone is writing for the electronic book and hope to see more on this new tool.

Clemens R. Gall
Crowley, LA

Teacher's Pet

Editor:

My wife and I are teachers and we love the Color Computer. We tried to use CoCo to do our school work, but managed only to do the grade-keeping using *Spectaculator* until we came upon *Teacher's Database II*, by David G. Bodnar and distributed by Tom Mix Software in Grand Rapids, Michigan.

It is terrific! Not only does it do all the record-keeping associated with teaching, it prints grade-book pages; blank grade sheets; progress reports for students; seating charts; sorts data any way you want it; performs statistical analysis; develops missing grade reports; and draws graphs of all statistical data, which can even be sent to the printer with an inexpensive dump program from Radio Shack. It will also develop a variable text file that can be used with certain word processors to prepare very elaborate reports for students.

The support and help the author has provided has been absolutely fantastic. In short, we can't praise it enough. We encourage your readers who are teachers to try this excellent program. They will love it as much as we do.

Howard D. Clark
El Paso, TX

REQUEST HOTLINE

Editor:

In your December 1985 issue, a letter from Bill Bernico was printed [Page 8], asking if you would include a picture of THE RAINBOW staff in a future issue. Instead of an actual picture, smiley-faces were printed. This may have been thought of as cute by some, but it was a let-down to me. I, too, am interested in seeing a picture of those involved in putting together our magazine.

Lonnie seems to think of the CoCo Community as being special. What a considerate and special thing it would be for THE RAINBOW to print a staff picture. It could almost be thought of as a "family picture." I know of no other magazine that has included such a photo, or any readers that asked for one! So why not get the "family" together for an evening and take out one page in THE RAINBOW to share with the CoCo Community what no other magazine has shared before.

Darren Nye
Manville, NJ

Editor's Note: Well, that's RAINBOW's copy editor, Tamara Renee Dunn, on our cover this month! Tell you what. As soon as we get some warm weather, we'll gather the entire staff in front of the building for a picture and print a copy in the magazine for you. We'll make it big enough so you can see who's who. We're flattered you asked.

Computer Contributions

Editor:

I represent a nonprofit, charitable organization that uses microcomputer equipment in virtually every aspect of its affairs. We would be grateful if your readers would consider contributing additional equipment. Donations of this sort can have substantial financial benefits. If you are in a position to contribute or would like more information, please write to me: Executive Director, Cambridge Center for Behavioral Studies, 11 Ware Street, 02138, or call (collect, if you like) at (617) 495-9020.

Robert Epstein, Ph.D.
Cambridge, MA

POKEs, PEEKs and EXECs, Oh My!

Editor:

Every month I read THE RAINBOW page by page hoping to find useful programs and tips. I find most of the tips in "Letters to the Rainbow." I mostly like the `POKE`s, `PEEK`s and `EXEC`s. They have helped me a lot in the programs I make. Could you do a feature on `POKE`s, `PEEK`s and `EXEC`s? It would be great if it would have some listed (like the no-list `POKE`) and tell what each one does.

David Murphy
N. Bellmore, NY

Editor's Note: You may find a book called *500 Pokes, Peeks 'N Execs*, by Spectrum Projects, Inc., very helpful. A review of this book appeared in the August 1985 RAINBOW, Page 199.

Pretty Pictures for the Downloading

Editor:

I think it would be an excellent idea if you were to offer the pictures in "CoCo Gallery" on disk or tape. I am amazed by some of the [graphics], and would like to be able to collect as many as I can. If you have plans on doing this in the future, count me in!

Dan Neuman
Wauwatosa, WI

Editor's Note: While the length of picture listings precludes our adding them to RAINBOW ON TAPE, we are considering posting them on our new Delphi CoCo SIG.

INFORMATION PLEASE

Editor:

I recently purchased a Color Computer and am very interested in its graphics capability. My family is in the farming business and I am in the process of transferring my maps to the computer by the *Graphicom* video digitizer. I have searched your magazine for some program that will do area determination by pixel recognition and have come up empty. Does anyone know of such a program that gives an area in square inches (or millimeters) from a non-square form on the screen? If not, can you tell me the relationship between the height and width of the pixel in the graphic's highest resolution? Send responses to Rt. 1, Box 317, 72376.

Drew Oliver
Proctor, AR

Computer Animation on a VCR

Editor:

I have heard that you can make animation on a computer and save it to a VCR. This was mentioned in a hint in your October 1984 issue on Page 199. I would like to know what I have to hook up.

Brian Collins
Waldorf, MD

Editor's Note: Hook your computer control box on the back of your TV onto your VCR. Then, if you have your computer set to channel 4, set your VCR to channel 4 (channel 3 if your computer is set to '3'). Take your cassette cable and plug the little gray cable (remote) into the jack mentioned in the hint you referred to. When you want to record do a `MOTOR ON`. Do a `MOTOR OFF` when you want to stop.

Word Processor Advice

Editor:

I have had a CoCo for about three years and use it mostly for writing. I have *VIP Writer*, which I have used for two years and am pleased with it. I purchased disk drives and per advice by the magazines I read, I purchased two DSDD TEAC drives and recently also purchased OS-9 and D.P. Johnson's *SDISK* plus *BOOTFIX*, which I find interestingly different from what I'm accustomed to, as my 40-track, two-sided, two-drive system now appears as an 80-track, two-drive system. On advice from Mr. Johnson, I am ordering *The Complete Rainbow Guide to OS-9* and disks. Since I have made the commitment to OS-9, I need some good advice as to the best choice of word processors to go along with my system, as I cannot use the *VIP Writer* with OS-9. Write to me at 110 NE Village Squire #8, 97030.

Fred Andre
Gresham, OR

Converting to Disk

Editor:

I have the *Database/Mailer 64-Letter Writer* tape version, which I purchased some time ago from EVS Engineering. Now that I have added disk drives, I would like to have the disk version of the above software. I have written to EVS twice, but have had my letters returned marked "addressee unknown." I have tried changing the software to work with disk, but I cannot.

Would you or your readers know of any way I might get this software on disk, or the changes necessary for disk operation? Contact me at 7807 Finch Trail, 78745.

Norman G. Thode
Austin, TX

Editor's Note: The last known address for EVS Engineering, which appeared in their ad in our September 1984 issue, is as follows: 9528 Suite 35, Miramar Road, San Diego, CA 92126.

Inverting the Screen

Editor:

What must I do to achieve an output that is representative of the Tandy 1000? By this I mean a video display that is entirely dark with the exception of the text.

Any information you could relay to me as well as other newcomers with this same desire would be greatly appreciated. My address is 4211-8 Cedar Lane, 23703.

Frank Matthews
Portsmouth, VA

Editor's Note: A video monitor adapter will get you off to a good start. To reverse the text screen you need a machine language driver program to set the CoCo up to use its green-on-black characters instead of black-on-green. For Hi-Res screens that many programs use to provide an expanded display, a video reverser modification is needed.

Shifting Down to Normal Speed

Editor:

I tried the speed-up `POKE 65495,0` on a graphics program I wrote and it worked fine for graphics generated from keyboard prompts, but commands from the X-Pad were ignored, and dumping the screen to my Prowriter produced gibberish. I tried poking the original value, `POKE 65495,126`, back in before each of these routines, but it didn't slow down. Is the speed-up `POKE` a permanent condition until you reset or cold start? How do I get my CoCo out of passing gear?

Greg Erickson
Lowell, MA

Editor's Note: The CoCo can be returned to normal speed with `POKE 65494,0`.

Editor:

I am a new CoCo owner. I have learned how to do many things, but I'm having trouble with four things. I don't know how to use the `DRAW` mode for graphics. I also don't know how to use `PLAY` or `PEEK`s and `POKE`s. I would also like to know what an SASE is.

Mark Beck
Kaukauna, WI

Editor's Note: Remember, it is very important to read all instructions before trying a new command or program. SASE stands for "self-addressed, stamped envelop."

It's in the Fine Print

Editor:

Could you or any of your readers advise me as to how I might list my source codes in "fine print" so that I can get a lot of lines listed on my screen at the same time? This would be of advantage when debugging. Write to me at 5121 Mortier Avenue, 32812.

Lynndel Humphreys
Orlando, FL

KUDOS

Editor:

This is a letter of congratulations on your magazine, your bulletin board, and to the advertisers who support you.

Although I've had my Color Computer for five years now, I did not subscribe to your magazine until last year. I find the articles and reviews informative and to the point. My friends kid me about using my CoCo at home. "It's a toy, isn't it?" they say, until I show them the power this "toy" has. My ability to program is the direct result of using the Color Computer to learn. I hope that Tandy realizes this computer has tremendous support thanks to your magazine and other periodicals that, unfortunately, have fallen by the wayside.

When I received the November 1985 issue, I immediately signed up online with the Delphi system to access your BBS. I was looking at the database when I received a message that someone wanted to talk to me in conference. Imagine my surprise when it was Jim Reed from RAINBOW! Also online was Darrell from Texas. There is tremendous potential in this, as observed when Brian Lantz held the OS-9 Users Club meeting one night. You guys and gals at RAINBOW have struck gold with this. Thank you for an idea whose time has come.

When I attended RAINBOWfest in Princeton, New Jersey, I was truly amazed at the relaxed, cheerful attitude that everyone had, from the school kids to the professionals. The vendors were very helpful and answered questions courteously and without reservation.

I have always received a fast response to problems I have with products I purchase for my Color Computer. These companies keep the CoCo alive; I believe they are sincere in their efforts and will continue their excellent customer support.

Vernon Davis
Woodstown, NJ

Sole Source of Computer Education

Editor:

I would like to commend you for the many years of enjoyment you have brought me through your excellent publications. It has inspired me tremendously and is my sole source of computer education. Although I have read virtually all of the other computer magazines, none have compared to the excellent programs I have found in THE RAINBOW. However, I would like to request that you publish more cassette programs compatible with the 16K CoCo. I favor the Adventure games most. I have found many others that I and the rest of my family just love!

Michael T. Anderson
Cloquet, MN

ASSEMBLY LANGUAGE PROGRAMMING for the TRS-80 COLOR COMPUTER

At last - The book exclusively for you and your CoCo !! You've learned BASIC and are now ready to learn assembly language programming. This hands-on guide begins with the basics and progresses to the expert level; revealing programming conventions and techniques and all the internal capabilities of the TDP-100, CoCo 1 and 2. At every step of the way are illustrations, sample programs, and plain English explanations. All sample programs are shown as assembled with Radio Shack's EDTASM+ cartridge. Plus, a complete chapter explains how to use all EDTASM+ capabilities. This book describes how to write subroutines, interrupt handlers, programs that control the graphics display modes, cassette, disk, keyboard, sound, joysticks, serial I/O, interrupts, and use of ROM resident subroutines. Not only is the MC6809E microprocessor described, but also the video display generator (VDG), peripheral interface adapters (PIA), and how they all work together. This book is suitable as a high school or college textbook.

CHAPTERS: The Binary Number System - Memory and Data Representation - Introduction to MC6809E Microprocessor - Addressing Modes of the MC6809E - MC6809E Instruction Set - Assembly Language Programming with EDTASM+ - Assembly Language Programming - Assembly Language and Extended Color BASIC - Internal Control and Graphics - Technical Details.

289 pages
soft cover

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$16.00 U.S. plus $1.50 shipping. Check or money order. RI residents please add 6% sales tax. Volume discounts are available.

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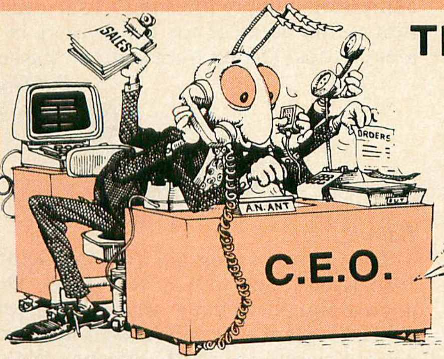

The Complete Electronic Organizer

by Warren Ulrich III

With this desktop software your CoCo becomes your own personal administrative assistant. Load C.E.O. first thing each workday and everything you need is at your fingertips! Screens are shown in an easy-to-read 51x24 hires display with upper and lower case. The Macintosh-like icons (pictures for commands) make it simple and fun to be organized, efficient, and on time!

DATE BOOK:
You'll never miss an important occasion again! C.E.O.'s calendar stores an entire year's appointments. Each day has entries for one special occasion, one memo, and hourly notes for 8 am to 5 pm. You can display or print any daily schedule or a whole week at a time.

CALCULATOR:
A full four function calculator is at your fingertips!

CLOCK:
The accurate real-time software clock keeps date and time, beeps on every hour, and has a convenient alarm you can set to remind you of those important appointments. Let C.E.O. do your clock watching for you!

FREEFORM FILE DRAWER:
C.E.O.'s free-form data base keeps your important info a few keystrokes away. Just type in your notes (up to 4600 characters with a 48 character title line) the same way you'd jot them down on a scratch pad. Your notes will be neatly organized and saved for instant retrieval! The sophisticated keyword search can scan all of the titles for any occurrence of a given phrase, making it easy to find notes on any topic. And there's room for alot of info—up to 479 entries can be stored on the data disk!

You can display or print any or all entries upon request. C.E.O.'s mini-formatter helps print it in easy-to-read style. Now you can keep track of clients, business notes, minutes of meetings, or "whatever" with ease!

MEMO PAD:
If you need to jot a note to yourself or someone else, just pull up C.E.O.'s convenient memo pad and type away! When you're done,, save and/or print it as you see it! Use it for quick memos, business communications, or personal reminders. It's easy, quick, and organized!

REQUIREMENTS: $49.95
64K and at least one disk drive are required. C.E.O. supports two drive operation when available.

New Version!

CoCo Cookbook

by N Manchevsky

CoCo Cookbook is more than just a recipe index! It is a true free format data base. Designed to store and retrieve a large number of recipes, each can use up to 3040 characters with title, ingredients, and instructions. To store other data just ignore the words recipe, etc. and enter whatever you want to store and retrieve! The powerful keyword search lets you find entries with any special word (or ingredient)! A new, powerful copy feature will selectively copy recipes to a new diskette using the keyword search, helping you to organize your info easily and quickly! (This feature requires at least two drives.) Over 200 recipes are now included. These great dishes alone are worth the price!

32K Disk $32.95

Merge 'n Mail

by Cris Erving

Designed to maintain, merge, and print mail list information, it includes a mail-merge feature that can insert your name and address info into letters created with your word processor. **64K Disk $32.95**

Flexi Filer

by Mike Lustig

If you keep track of a lot of information—store it and retrieve it again and again—Flexi Filer makes it easy! With this comprehensive and flexible database system you can define your own file format and design your own reports. **32K Disk $39.95**

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Personal Finance System

by BJ Chambless

Your CoCo is your personal bookkeeper! Set a monthly budget, personal chart of accounts, and then enter each transaction. PFS compares monthly expenses with your budget and prints personal financial reports. The investment and loan module calculates details of financial transactions too!

32K Disk $32.95

Don't Forget!

by Warren Ulrich III

With Don't Forget! you can record the entire year's occasions and daily appointments. Each day has 4 Special Occasions, 2 Memos, and hourly notes for 6 am-9 pm. Display or print any daily schedule—or a whole week. You'll remember every important event!

32K Disk $32.95

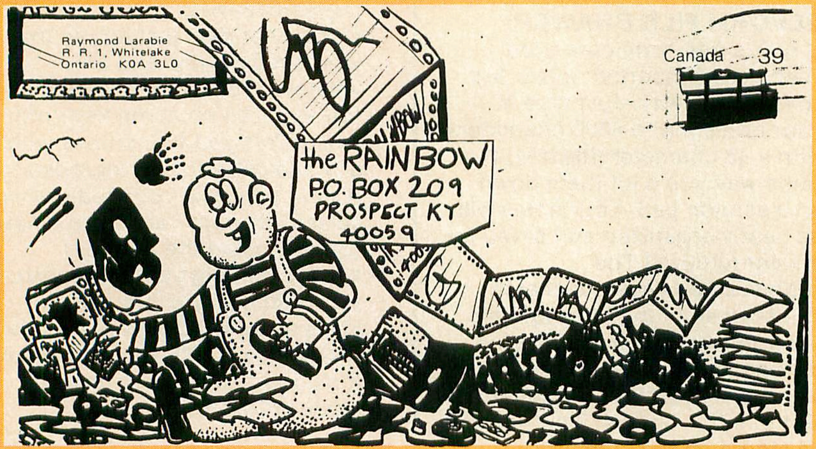
Gushing with Thanks

Editor:

Although I have enjoyed your magazine in the past, I used to be amused by some letters to the editor that were gushing with praise. I felt above all that. Well, I was wrong. When I bought BASIC09 to run on my one-disk system, Tandy's documentation gave no help. I hunted through old RAINBOWs knowing that help was there. I found it and can now run BASIC09 on my one-disk system. The next month I got a bonus with the article on booting the OS-9 disk directly. The final blow to my superiority came with the December 1985 issue [Hint, Page 208] on the $4.95 keyboard to replace my old chiclet-style keyboard. Wow! I could not believe it. There must be some mistake. But no. I got the keyboard and, with the fine instructions from Mike Sweet, I am typing with ease on my new keyboard. So what I am getting to is that THE RAINBOW is, to use a worn-out expression, simply awesome. Your dedication to the needs of the CoCo users in all areas is tops. Thanks from another "gusher."

Bill Ohsie
Deer Park, TX

ARTS AND LETTERS



Envelope of the Month

Raymond Larabie
Ontario, Canada

CADzooks!

Editor:

The *CoCocad* program from the October 1985 issue [Page 131] is very good. Does anyone out there know where I can get a CAD program that will help in laying out printed circuit boards? If someone has one for sale contact me at 11440 E. Pine, 74116.

Tony Rapson
Tulsa, OK

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

Letters to the editor may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` **and address to:** `EDITORS`.

GIVE SPEED AND POWER TO YOUR COCO-2!

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With **TURBO BASIC™** you can get for your **TRS-80** color computer 2 the speed of a compiler plus the flexibility of an interpreter. You don't need to call a special program to compile your **BASIC** program. **TURBO BASIC™** is compatible with **DISK-BASIC** and you can run your already existing programs without trouble. Here are some features of **TURBO BASIC™**:

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	COCO-2		APPLE II		IBM	
	TURBO BASIC	DISK BASIC	EXPEDITER (COMPILER)	APPLESOFT	COMPILER	BASICA
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-**8** caracters variables
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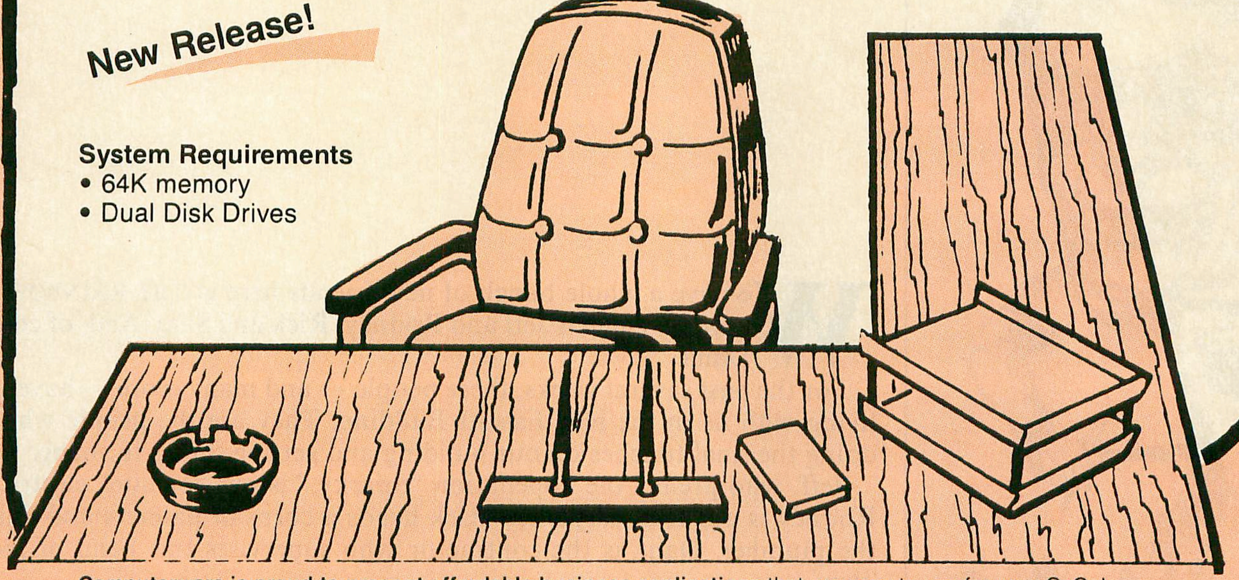

Computerware is proud to present affordable business applications that are easy to use for your CoCo! We are able to offer our powerful business software without requiring any additional software. **All you need is 64K and two disk drives!**

Computerware's business applications have been in use for over 5 years, so you know they are **proven and well-tested.** They are not tutorials, though, and do assume you know and use sound accounting principals. However, these menu-driven systems are truly user-friendly and are accompanied by comprehensive manuals.

GENERAL LEDGER $125

This is a comprehensive double-entry accounting system with complete audit trails, closing procedures, and full reporting. The chart of accounts is flexible and the system easy to use. Reports include the General Ledger, Trial Balance, Balance Sheet, Income Statement, and Transaction Register. Your financial information is at your fingertips!

CHECK LEDGER $125

This is a single-entry bookkeeping system which allows the users to define a chart of income and expense accounts. Year-to-date totals are maintained for each account as well as complete checking account history. By just entering your checking account information, you can have always-current visibility over your income and expense ledgers. Financial statements and taxes are a snap!

PAYROLL $175

This is the most comprehensive payroll you'll find on a micro-computer. Besides collecting key employee information, it allows entry of pay rates for standard hours, overtime, and salary. Hourly, salary, and commissioned employees may be paid weekly, bi-weekly, semi-monthly, and monthly. Two types of special monthly deductions are also accommodated. Year-to-date, quarterly, monthly and current totals are maintained. All federal reporting is done automatically and your state computations are also included.

INVENTORY CONTROL $125

This system is designed to help the retailer, distributor, or businessman to keep control of this important factor. It stores your cost and quantity information, updates it immediately, and offers you key management reports with useful summaries at any time. With four costs, four locations, selling history, and vendor information for each item, you will always have the facts!

ACCOUNTS PAYABLE $125

This system can give you the tools to plan your business' growth by controlling expenditures and forecasting cash requirements. It helps a small business manage and track its cash liabilities by collecting vendor invoice information and reporting the business' cash commitments and payment history. Along with standard payables reports, it also includes payment forecast reports.

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All businesses need to know who owes them money! This system provides reliable and timely information regarding the status of all customer accounts. You can know instantly which accounts are past due, forecast how much money to expect to receive for cash flow planning, and keep on top of your customers' credit positions. Customer name, address, credit limit, invoice, and payment information is recorded and reports of all information including customer statements are available upon your request.

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Dealer Inquiries Invited

We have a whole bunch of new friends here at THE RAINBOW this month. There is Jeff and Rodney, Rick and Sam. And, of course, Dana.

For the past several weeks, these people — and many more — have been living with us in the new Falsoft Building. They are the people who are doing the final touches on our building and getting things in shape.

Jeff, who prefers the appellation "Sparky," is our "on-site" electrician. Rodney is our trim carpenter. Rick heads a corps of painters and Sam is the plumber. Dana is the contractor who supervises this band of merry men.

Moving from 4,800 square feet to 18,000 on three floors has required some adjustment. Thanks to Jim, things have been easier. He installed our new telephone system — so when we need Rodney, we just use the phones to page a message like "Desperately Seeking Rodney," rather than go hunting for him.

Jim, by the way, is also responsible for the music-on-hold you hear if you call us. Well, actually, he made it work, but if you don't like the selection of songs about rainbows, I guess you can blame me. I recorded the music.

We seem to have been a good influence on everyone, too. Several of our new friends have bought Tandy computers since the job started!

All of this is by way of saying that we've *finally* moved into our new building. The kinks are certainly not out yet, by any means, but we are here, we're warm (once they fixed the heat) and everyone is settling in.

Considering that, before the move, each staff member had an average of 96 square feet in which to work and now each has 360, you can imagine there is a world of difference in efficiency alone. Each of our editors, for instance, has a countertop for his or her computer(s), disk drives and tape recorders, printers and whatever; shelves above the counters for software, manuals and the like; and (hurrah!) electric outlets and power strips galore.

We even have enough telephone lines that we are able to have several people on modems at the same time (a big boost for our Delphi activities), room to have board sessions in our own conference room (away from the hubbub), and so on.

We'll have an "open house" after the first of the year and we want you to come! If you can't make it, try to make Prospect (Louisville) a stop on your next trip. We'd love to show you around.

* * *

Now that we've moved, we have the space to do something we've planned for a long time — take over the duplication of RAINBOW ON TAPE. We've

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
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- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

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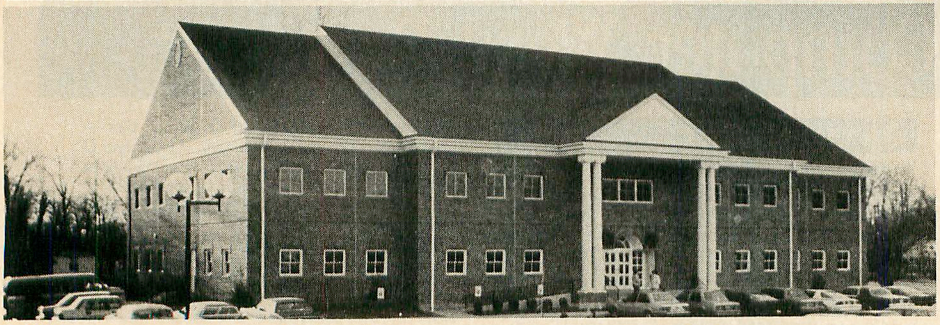
outgrown several "tape duplicators" since we started this very popular service, but the one thing that has bothered me the most is our inability to react quickly when someone has a problem.



"Our new Falsoft Building — the house that RAINBOW built."

Our "deal" has always been that we pay a certain amount for a duplicated tape, and the duplicator guarantees that tape will load and run. When it did not, some of you sent the tape to the "replacement" address, some sent it to us and some called or wrote letters. This tended to delay the replacement process.

Also, there's nothing like doing your own work. You can establish priorities, double-check quality and the like. No matter how conscientious someone else is, they aren't you. I think this will be a big plus for our RAINBOW ON TAPE program.

* * *

And speaking of things we are up to, one of them is planning for RAINBOWfest in Palo Alto. It is a first for Northern California and we expect a great show. Bill Gattis, vice president of the educational division of Tandy, will be the speaker at our CoCo Community Breakfast. I'm particularly pleased Bill has agreed to join us because of the increasing role the CoCo has garnered in the education field.

In addition, a whole host of CoCo people will be present — many of them giving seminars. Bill Barden will be on hand, Steve Bjork, Dan Downard, Marty Goodman and others. John Gibney of Delphi will also speak, as will Wayne Day of the CompuServe Color SIG.

There's a reservation form in this issue of the magazine (see Page 114). Be sure to fill it out and join with us and the CoCo Community in Palo Alto!

* * *

Finally, I continue to be amazed at the high quality of the Color Computer at an affordable price. Pass the word. You'll do a friend a favor!

— Lonnie Falk

MUL-T-SCREEN

COLOR CHARACTER GENERATOR

A NEW DIMENSION IN COLOR COMPUTING

RAINBOW CERTIFICATION SEAL

- Now includes a character generator and sample graphic space game at no extra cost.
- Full 224 text and graphic characters. Underline in all PMODES. Prints vertically.
- All machine language, user transparent. Supports all BASIC, EXTENDED BASIC and DISK commands.
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- Use up to 4 defineable window screens of any size. Also includes horizontally scrolling (crawling) one line screens.
- Includes positive & negative screen dumps in 2 sizes for R/S, Epson & Gemini printers. (Please specify)
- Special Trace Delay can be used to debug programs one line at a time (even graphics).
- A special printer control can output characters to the screen & printer simultaneously.
- A must for all color computer owners. Once you try it you won't write another program without it.

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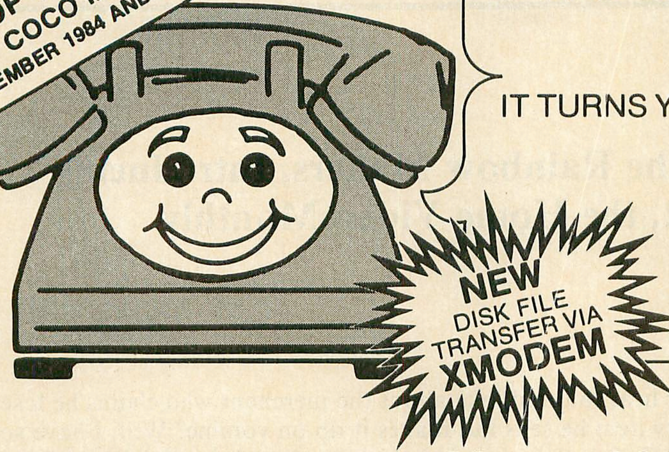

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From the Rainbow Makers, Introducing . . . VCR, the Home Video Monthly

You ever hear that old joke about the merchant who claims he loses money on every item he sells but makes it up on volume? Well, I have something akin to that strategy in mind this month with a special introductory offer just for RAINBOW readers.

Here's the scoop. While this issue of THE RAINBOW is being wrapped up, the big presses are already rolling on our newest publication, *VCR, The Home Video Monthly*. By the time you see this, our premier issue of *VCR* will be on the newsstands nationwide. It's a big gamble on our part and, candidly, we're biting our nails.

You see, unlike the modest, one-step-at-a-time approach used in developing THE RAINBOW, this time, as we say in these parts, "we're going whole hog." Instead of starting, as Lonnie did in launching RAINBOW, with two sheets of paper, Xeroxed front and back, *VCR* debuts on 76 pages of high-quality stock with color throughout. Only a dozen copies were made of the first RAINBOW, while *VCR*'s initial press run is a whopping 80,000. About the only factor that hasn't increased exponentially is the charter subscription price. RAINBOW began at $12 annually, and (four and a half years later) *VCR* is just $15 for a full year's subscription. You get the picture; it's a big stakes proposition for us. We need your help.

We want you to go out and buy a copy of our first issue of *VCR, The Home Video Monthly*. While Kevin Nickols, Vince Staten and Kevin Quiggins have spearheaded this new thrust, many of the same folks who create THE RAINBOW each month also have given it their very best shot. We're proud of our newest creation and we believe you'll like it, too. (Read our ad on Page 66 for more details about the magazine itself.)

How many of you CoCo enthusiasts also have VCRs? Would you ask for *VCR* at your favorite newsstand?

While *VCR* is well worth the $1.95 cover price, here's something to sweeten the pot. If you'll get a copy of *VCR*, fill out the subscription card inside and send it to us along with $3, we'll send you a special issue cassette tape with a handful of CoCo programs of particular interest to CoCo lovers who have VCRs, too! Among these programs are a database designed for cataloging your video tape library and a utility to help you fine tune your TV reception. We've been setting aside some material just for this occasion because we believe one good turn deserves another. The $3, which should barely cover our production and shipping costs, can even be charged to your credit card if you like; just fill out the *VCR* subscription card and check the credit card of your choice. Write "tape offer only" on the subscription card just to keep the record straight, but, if you also want a *VCR* subscription, tell us "tape and subscription, too." We'll be happy to make you a charter subscriber.

Once you've seen a copy of *VCR* and had a chance to examine it, we not only welcome, but earnestly solicit your comments. Tell us what to add, what to discard, what to change. Your candid opinions have helped us shape THE RAINBOW; now we need to know your home video needs. Together we've built THE RAINBOW, let's be partners in home video, too.

— Jim Reed

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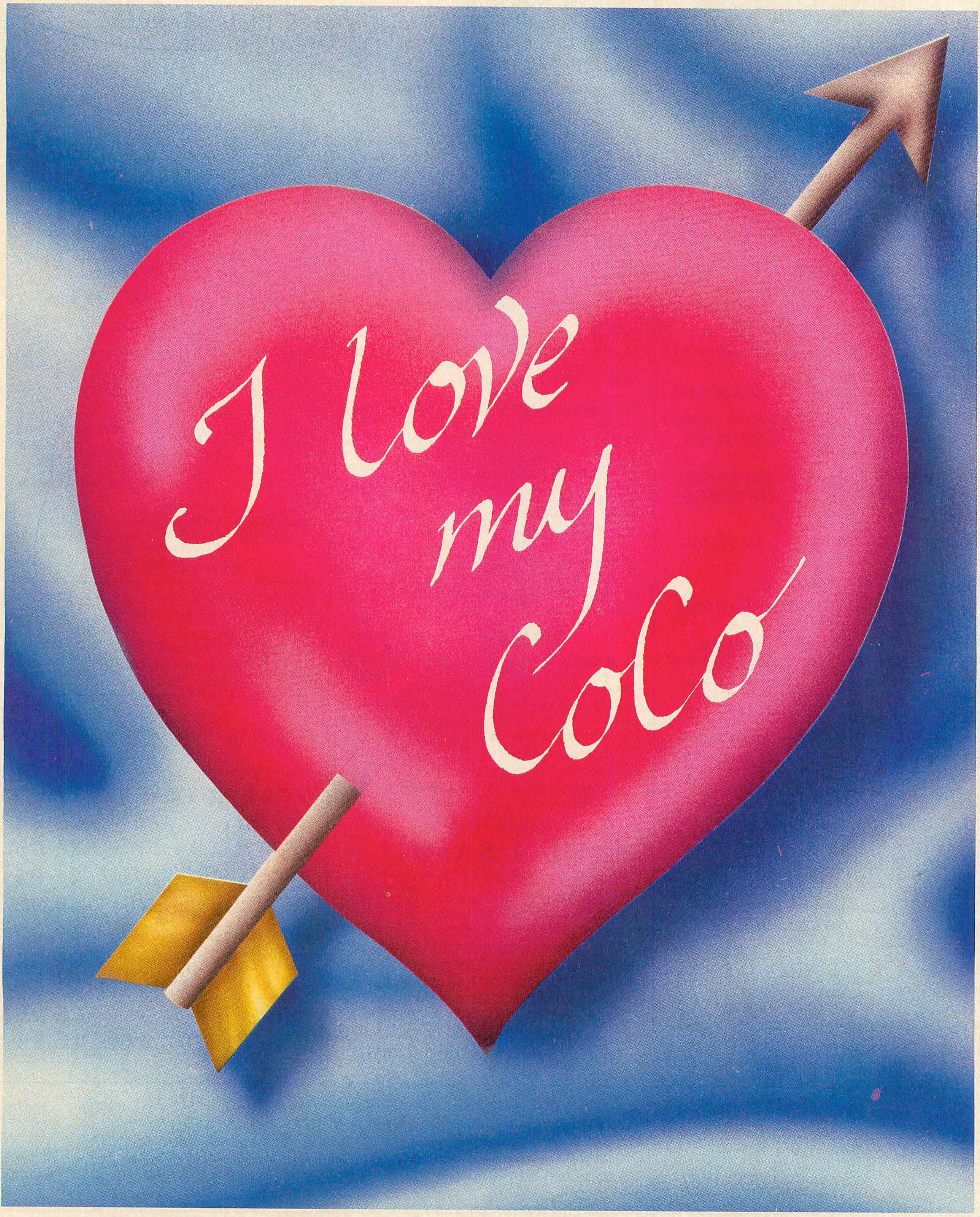
I love
my
CoCo

Are you looking for a special Valentine's message for that special person — something other than the usual selection of mass-produced greeting cards? Why not let CoCo dispatch Cupid's declaration for you?

The Electronic Valentine-Maker

By Brian P. Roden

These two programs can help you send an original and personalized valentine. The first program, *Valprint*, prints the outline of a heart with a message inside. The second, *Valname*, prints a heart using the letters of a name.

Valprint

When typing in Listing 1, do *not* type the numbers between the X's. These numbers indicate how many spaces should be put between the X's. Be very careful with this procedure; if the spaces are not entered correctly, the heart will not line up properly.

The listing is for a CGP-115 plotter/printer. If you are not using a CGP-115, then make the following changes:

```
5 CLS
DEL 220-290
```

The program then only prints the heart's outline. If you are using a CGP-115, you can choose the heart color, have one of three messages printed inside the heart, and choose the color of the messages.

When you have entered and saved the program, run it. The computer will ask: HEART COLOR (0-3). Type a number for the desired color (0=black, 1=blue, 2=green, 3=red). Make sure the printer is on and ready, and press ENTER. The outline of the heart will then be printed.

Next, the computer prints these three options (see Figures 1-3).

(Brian Roden is a sophomore at Northeast High School in North Little Rock, Arkansas, where his favorite subject is math. He is an honors student and hopes to enter the computer science field after college.)

1) I LOVE YOU
2) BE MINE
3) XX + XX (initials)

Type the number of the message desired and press ENTER. If you don't want a message, hit BREAK. The computer will again ask for a color. Enter the number of the color in which you wish the message to be printed.

If you choose Option 3, XX + XX, the computer asks for the first and last initials of the first person and the first and last initials of the second person. The initials are then printed in the proper places with the '+'.

Next, the computer asks if you want to print another valentine. Type `Y` or `N` and press ENTER.

Without the CGP-115 printer, the computer will not ask for colors or message numbers.

Valname

When you run *Valname* (Listing 2) the computer asks for a name. You may type in anything. If you get an OS Error, type `CLEAR 200: RUN` and press ENTER. After entering the name, the computer asks for a color number. Type a number from '0' to '3' and press ENTER. The heart should then be printed (see Figure 4). The program will ask you if you want another valentine. If so, type `Y` and press ENTER, otherwise, type `N`.

Again, if you don't have a CGP-115 printer, delete lines 40 and 50 of *Valname*.

How *Valname* works

Valname stores the name entered in string variable N$. The computer prints to a tab position and sets 'X' equal to the number of characters on the current line. The subroutine at 1000 sets 'Y' to go through each position on the line. The computer prints the Nth letter in the name. When 'N' is equal to the length of N$, 'N' is reset to one. The computer then starts back at the beginning of the name. When the computer has printed the number of characters for the current line, it returns to the main program. The last `PRINT#-2` on each line generates a line feed and carriage return.

(Any questions about these programs may be directed to Brian at 1624 Saratoga Drive, North Little Rock, AR 72116, phone 501-835-2032. Please enclose an SASE when writing.) ☐

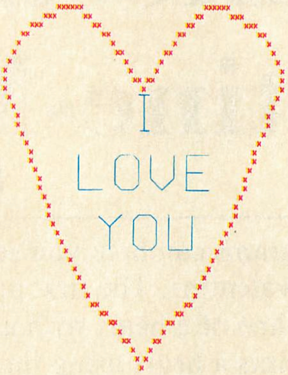

Figure 1: "I Love You" printout

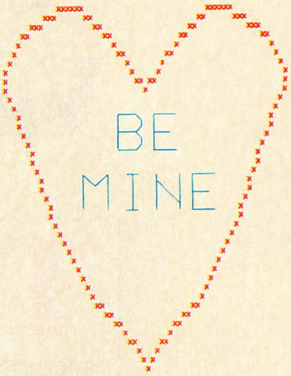

Figure 2: "Be Mine" printout

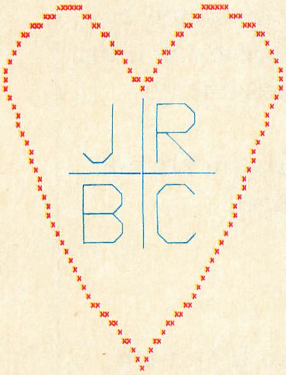

Figure 3: Initial printout

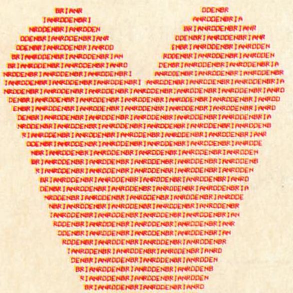

Figure 4: *Valname* example

14 73
46 78
END 96

Listing 1: `VALPRINT`

```
1 CLS:INPUT"HEART COLOR (0-3)";C
:PRINT#-2,CHR$(18):PRINT#-2,"C";
C:PRINT#-2,"S0":PRINT#-2,"A"
2 FOR X=1 TO 41:READ A,A$:PRINT#
-2,TAB(A);A$:NEXT
5 DATA 21,XXXXXX
           XXXXXX
6 DATA 18,XXX      XX
            XX      XXX
7 DATA 15,XXX           XX
             XX           XXX
8 DATA 13,XX                XX
             XX                X
X
9 DATA 12,X                    X
             X
  X
10 DATA 11,X
  XX         XX
     X
11 DATA 10,X
     X       X
       X
```

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```
12 DATA  9,X
       X     X
         X
13 DATA  9,X
        XX XX
         X
14 DATA  9,X
          X
         X
15 DATA 10,X

       X
16 DATA 11,X

     X
17 DATA 12,X

   X
18 DATA 12,X

   X
19 DATA 13,X

 X
20 DATA 14,X
                               X
21 DATA 15,X
                             X
22 DATA 15,X
                             X
23 DATA 16,X
                           X
24 DATA 17,X
                         X
25 DATA 17,X
                         X
26 DATA 18,X
                       X
27 DATA 19,X
                     X
28 DATA 19,X
                     X
29 DATA 20,X
                   X
30 DATA 21,X
                 X
31 DATA 22,X
               X
32 DATA 23,X
             X
33 DATA 24,X
           X
34 DATA 25,X
         X
35 DATA 26,X
       X
```

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```
36 DATA 27,X
     X
37 DATA 28,X
   X
38 DATA 29,XX
XX
39 DATA 31,XX               XX
40 DATA 33,XX           XX
41 DATA 35,X         X
42 DATA 36,XX     XX
43 DATA 38,X   X
44 DATA 39,X X
45 DATA 40,X
46 CLS:PRINT"1) I LOVE YOU":PRIN
T"2) BE MINE":PRINT"3) XX + XX":
INPUT N
47 IF N<>1 AND N<>2 AND N<>3 THE
N 46
48 IF N=2 THEN 55
49 IF N=3 THEN 60
50 INPUT"COLOR (0-3)";C:PRINT#-2
,CHR$(18):PRINT#-2,"C";C:PRINT#-
2,"S7":PRINT#-2,"R226,325":PRINT
#-2,"I":PRINT#-2,"PI":PRINT#-2,"
H":PRINT#-2,"R-70,-80":PRINT#-2,
"I":PRINT#-2,"PLOVE":PRINT#-2,"H
":PRINT#-2,"R25,-80":PRINT#-2,"I
":PRINT#-2,"PYOU"
51 PRINT#-2,"S0":PRINT#-2,"A":GO
TO100
55 INPUT"COLOR (0-3)";C:PRINT#-2
,CHR$(18):PRINT#-2,"C";C:PRINT#-
2,"S7":PRINT#-2,"R204,300":PRINT
#-2,"I":PRINT#-2,"PBE":PRINT#-2,
"H":PRINT#-2,"R-45,-80":PRINT#-2
,"I":PRINT#-2,"PMINE":PRINT#-2,"
S0":PRINT#-2,"A":GOTO100
60 INPUT"COLOR (0-3)";C:PRINT#-2
,CHR$(18):PRINT#-2,"C";C:PRINT#-
2,"S12":PRINT#-2,"R243,275":PRIN
T#-2,"I"
65 FOR X=1 TO 4:READ A,B:PRINT#-
2,"D";A;",";B:PRINT#-2,"H":NEXT
70 DATA 0,100,100,0,-100,0,0,-10
0
75 INPUT"FIRST NAME, FIRST INITI
AL";A$:INPUT"FIRST NAME, LAST IN
ITIAL";B$
80 INPUT"SECOND NAME, FIRST INIT
IAL";C$:INPUT"SECOND NAME, LAST
INITIAL";D$
85 PRINT#-2,"M-80,2":PRINT#-2,"P
";A$:PRINT#-2,"M20,2":PRINT#-2,"
P";B$
90 PRINT#-2,"M-80,-105":PRINT#-2
,"P";C$:PRINT#-2,"M20,-105":PRIN
T#-2,"P";D$
95 PRINT#-2,"S0":PRINT#-2,"A"
100 INPUT"ANOTHER VALENTINE (Y/N
)";AN$:IF AN$="Y" THEN 1 ELSE EN
D
```

Listing 2: VALNAME

```
95 .......217
180 ........9
END ......81
```

```
10 CLS
20 INPUT"NAME ";N$
30 N=1
40 INPUT"COLOR (0-3)";C
50 PRINT#-2,CHR$(18):PRINT#-2,"C
";C:PRINT#-2,"S0":PRINT#-2,CHR$(
17)
55 PRINT#-2,TAB(21);:X=6:GOSUB 1
000:PRINT#-2,STRING$(27,32);:GOS
UB 1000:PRINT#-2
60 PRINT#-2,TAB(18);:X=11:GOSUB
1000:PRINT#-2,STRING$(23,32);:GO
SUB 1000:PRINT#-2
65 PRINT#-2,TAB(15);:X=16:GOSUB
1000:PRINT#-2,STRING$(19,32);:GO
SUB 1000:PRINT#-2
70 PRINT#-2,TAB(13);:X=20:GOSUB
1000:PRINT#-2,STRING$(15,32);:GO
SUB 1000:PRINT#-2
75 PRINT#-2,TAB(12);:X=22:GOSUB
1000:PRINT#-2,STRING$(13,32);:GO
SUB 1000:PRINT#-2
80 PRINT#-2,TAB(11);:X=25:GOSUB
1000:PRINT#-2,STRING$(9,32);:GOS
UB 1000:PRINT#-2
85 PRINT#-2,TAB(10);:X=27:GOSUB
1000:PRINT#-2,STRING$(7,32);:GOS
UB 1000:PRINT#-2
90 PRINT#-2,TAB(9);:X=29:GOSUB 1
000:PRINT#-2,STRING$(5,32);:GOSU
B 1000:PRINT#-2
95 PRINT#-2,TAB(9);:X=31:GOSUB 1
000:PRINT#-2,CHR$(32);:GOSUB 100
0:PRINT#-2
100 PRINT#-2,TAB(9);:X=63:GOSUB
1000:PRINT#-2
105 PRINT#-2,TAB(10);:X=61:GOSUB
 1000:PRINT#-2
110 PRINT#-2,TAB(11);:X=59:GOSUB
 1000:PRINT#-2
115 PRINT#-2,TAB(12);:X=57:GOSUB
 1000:PRINT#-2
120 PRINT#-2,TAB(12);:X=57:GOSUB
 1000:PRINT#-2
125 PRINT#-2,TAB(13);:X=55:GOSUB
 1000:PRINT#-2
130 PRINT#-2,TAB(14);:X=53:GOSUB
 1000:PRINT#-2
```

```
135 PRINT#-2,TAB(15);:X=51:GOSUB
 1000:PRINT#-2
140 PRINT#-2,TAB(15);:X=51:GOSUB
 1000:PRINT#-2
145 PRINT#-2,TAB(16);:X=49:GOSUB
 1000:PRINT#-2
150 PRINT#-2,TAB(17);:X=47:GOSUB
 1000:PRINT#-2
155 PRINT#-2,TAB(17);:X=47:GOSUB
 1000:PRINT#-2
160 PRINT#-2,TAB(18);:X=45:GOSUB
 1000:PRINT#-2
165 PRINT#-2,TAB(19);:X=43:GOSUB
 1000:PRINT#-2
170 PRINT#-2,TAB(19);:X=43:GOSUB
 1000:PRINT#-2
175 PRINT#-2,TAB(20);:X=41:GOSUB
 1000:PRINT#-2
180 PRINT#-2,TAB(21);:X=39:GOSUB
 1000:PRINT#-2
185 PRINT#-2,TAB(22);:X=37:GOSUB
 1000:PRINT#-2
190 PRINT#-2,TAB(23);:X=35:GOSUB
 1000:PRINT#-2
195 PRINT#-2,TAB(24);:X=33:GOSUB
 1000:PRINT#-2
200 PRINT#-2,TAB(25);:X=31:GOSUB
 1000:PRINT#-2
205 PRINT#-2,TAB(26);:X=29:GOSUB
 1000:PRINT#-2
210 PRINT#-2,TAB(27);:X=27:GOSUB
 1000:PRINT#-2
215 PRINT#-2,TAB(28);:X=25:GOSUB
 1000:PRINT#-2
220 PRINT#-2,TAB(29);:X=23:GOSUB
 1000:PRINT#-2
225 PRINT#-2,TAB(31);:X=19:GOSUB
 1000:PRINT#-2
230 PRINT#-2,TAB(33);:X=15:GOSUB
 1000:PRINT#-2
235 PRINT#-2,TAB(35);:X=11:GOSUB
 1000:PRINT#-2
240 PRINT#-2,TAB(36);:X=9:GOSUB
1000:PRINT#-2
245 PRINT#-2,TAB(38);:X=5:GOSUB
1000:PRINT#-2
250 PRINT#-2,TAB(39);:X=3:GOSUB
1000:PRINT#-2
255 PRINT#-2,TAB(40);:X=1:GOSUB
1000:PRINT#-2
260 GOTO 10
1000 FOR Y=1 TO X
1005 PRINT#-2,MID$(N$,N,1);:IF N
= LEN(N$) THEN N=1 ELSE N=N+1
1010 NEXT Y
1015 RETURN
```

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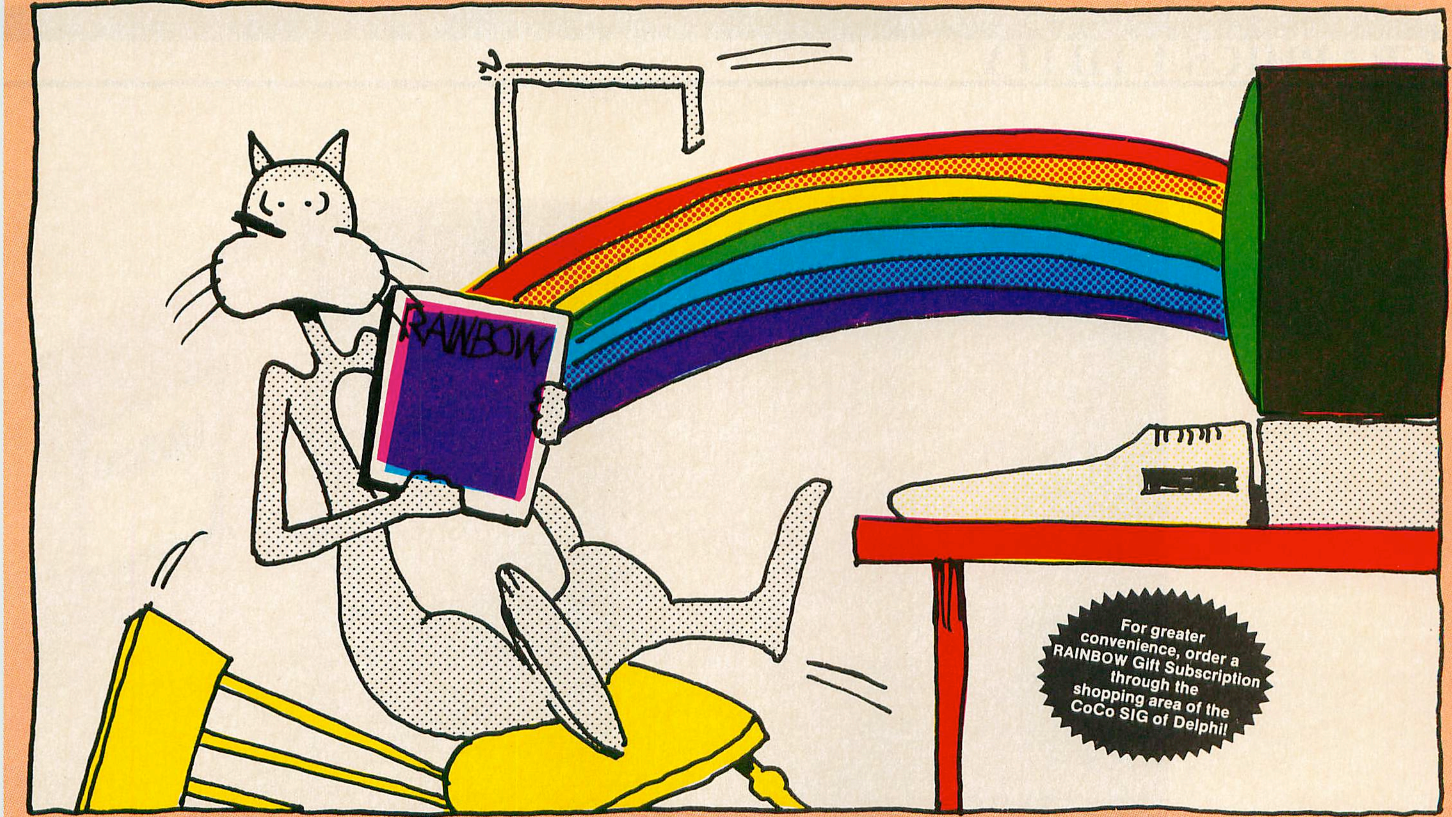

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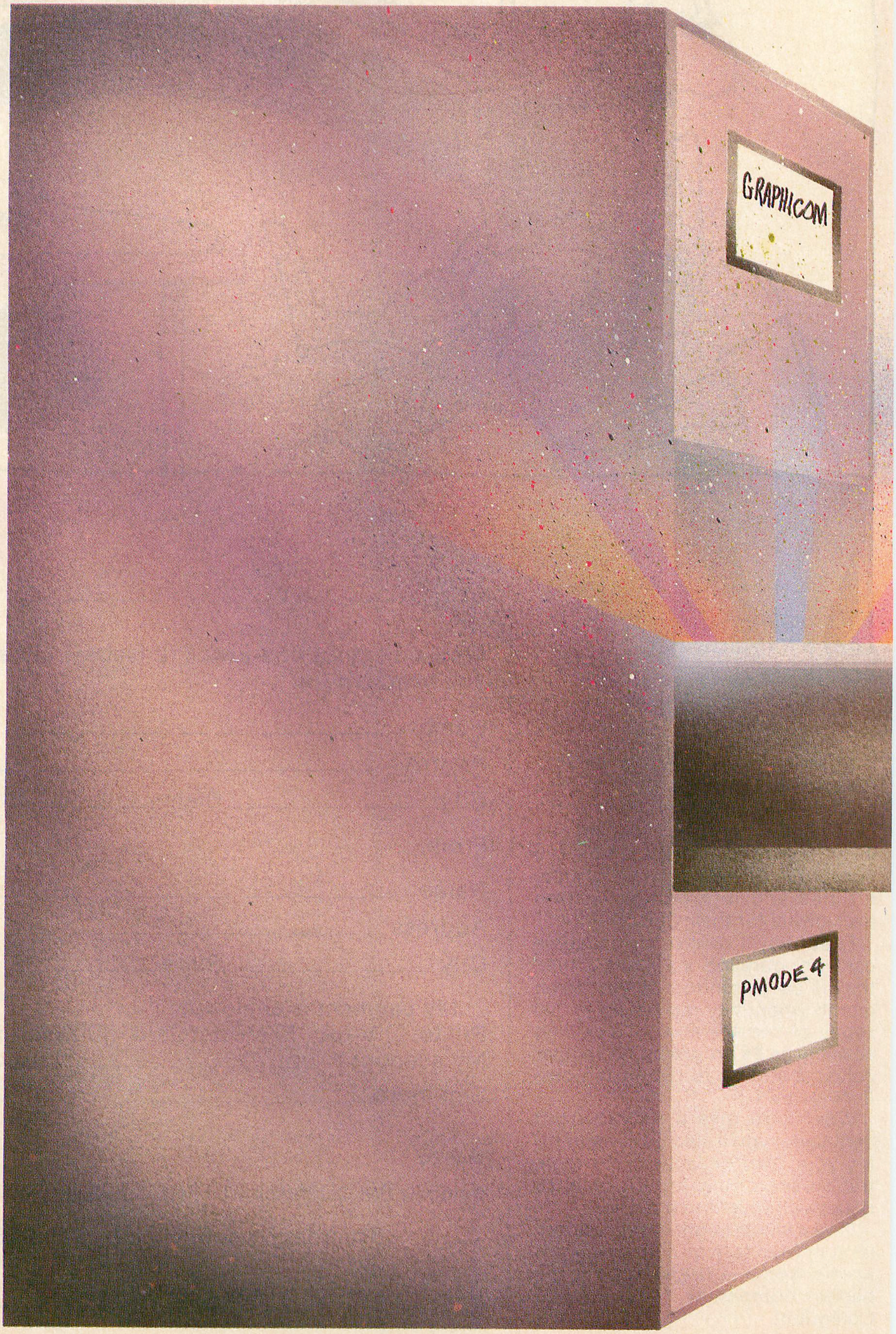
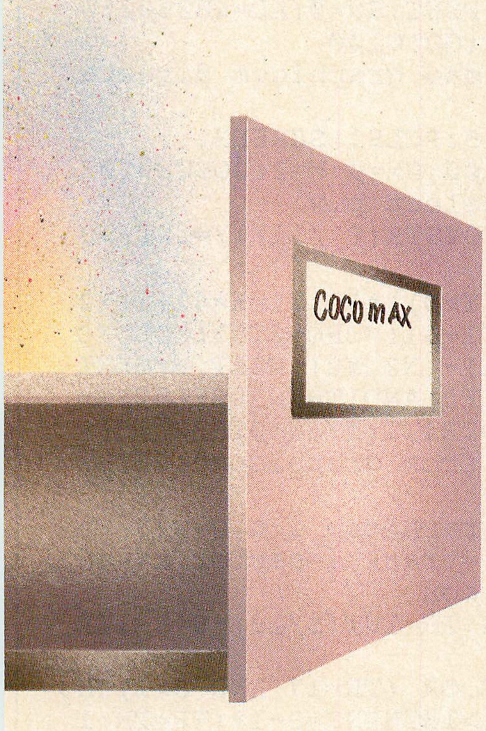

GRAPHICOM
PMODE 4

Getting picture formats together

Pix Files



By Joseph Kohn

Supposing we consider the standard format PMODE4 picture to be the infant of high resolution CoCo graphics, then *Graphicom* (by Cheshire Cat) is probably the teenager, and surely *CoCo Max* (by Colorware) is the young adult. As is typical of these "generation gaps," they have difficulty communicating with one another. Although all three use PMODE4, their picture file formats are sufficiently different, so moving pictures between them requires some thought or even special transfer routines.

The program listed here, *PixFiles*, provides a convenient means for interformat picture file transfer. The picture formats include:

1) Standard PMODE4 Picture — This is the normal Extended BASIC format with the picture LOADMed and SAVEMed between RAM locations $E00 and $25FF.

2) *CoCo Max* Picture — This format is similar to Standard, except two screens, all eight graphics pages, are LOADMed and SAVEMed between RAM locations $E00 and $3DFF. *CoCo Max* files always have the extension MAX. It should be noted that the single screen file produced by *CoCo Max*, *SCREEN/BIN*, is a Standard format picture.

3) *Graphicom Picture* — The *Graphicom* file format is completely unique. It stores 24 pictures plus the *Graphicom* directory and working font on sequential sectors and tracks, skipping over the standard disk directory, Track 17. Pictures are loaded and saved from specific areas of the disk by selection from the *Graphicom* illustrated directory.

PixFiles is completely self-prompting and menu driven. Most operations are performed using the right joystick. Pictures can be loaded and saved to any disk drive. If you have more than two, change DX in Line 740 to the number of drives you intend to use.

Several error traps are built-in:

- *Graphicom* disks are checked for proper format.
- Before SAVEM for Standard and *CoCo Max* pictures, the disk is checked for sufficient storage space. This also prevents a SAVEM to a *Graphicom* disk.
- A check is made for Standard files to ensure that they are 6,144 bytes long.
- Filenames cannot exceed the maximum number of characters.
- A *Graphicom* LOAD/SAVE can be aborted by selecting a blank screen at the top of the illustrated directory.
- *CoCo Max* files must have the extension MAX.

The principle behind *PixFiles* is to first retrieve the picture you want to transfer from its source disk and place it in the Standard picture area of RAM. You can then examine it using "see working pix" on the main menu. This working screen picture is then saved to the destination disk in the selected format.

The only tricky part to keep track of is that *CoCo Max* pictures use two screens. After loading, if you intend to transfer the first (upper) screen, then

---

(Joseph Kohn is a staff engineer with Goodyear Aerospace in Akron, Ohio. His interests are graphics and utilities.)

answer "no" to the "copy screen 2 to working pix?" prompt. To transfer the second (lower) screen, answer "yes."

To transfer pictures to *CoCo Max*, they are first saved in temporary files. Pictures can be temporarily saved as Screen 1 or Screen 2. You must have pictures temporarily saved to both screens before the final "save screens 1/2." The temporary files and the final save must be on the same drive and disk.

If you are typing in the listing, the comments may be deleted. After entering and saving the program, start debugging, but be sure to use backups of all the picture files you are working with!

A blank space has been left on the main menu. This is for you to add your own routine or call another program. This is a handy place for a screen print routine, for example.

(You may contact the author of this program with any questions at 4333 Larchwood Circle, NW, Canton, OH 44718, phone 216-492-7819. Please include an SASE when writing.) ☐

120	126
290	54
430	52
550	111
700	17
880	165
970	206
END	255

The listing: PIXFILES

```
10 'PIX FILES
20 'JOSEPH KOHN
30 '4333 LARCHWOOD CR.,NW
40 'CANTON, OH 44718
50 IFX=0THENPCLEAR8:X=1:GOTO50
60 CLEAR3000,&H7FFF:DIMF$(68),GS
(40,30),X$(22):FB=&HFF00:DK=&HC0
04:PB=PEEK(DK+2)*256+PEEK(DK+3):
DR=PEEK(PB+1)
70 DATA GRAPHICOM PIX,graphicom
pix,COCO MAX PIX,coco max pix,ST
ANDARD PIX,standard pix,SEE WORK
ING PIX,see working pix,PIX DRIV
E,pix drive, , ,QUIT,quit,TEMPOR
ARY SAVE SCREEN 1,temporary save
 screen 1,TEMPORARY SAVE SCREEN
2,temporary save screen 2
80 DATA SAVE SCREENS 1/2,save sc
reens 1/2,ABORT SAVE,abort save,
X
90 READX$(X):IFX$(X)<>"X"THENX=X
+1:GOTO90
100 PMODE4,1:X$="PIX FILES":GOSU
B810:LN=0:FORX=0TO6:PRINT@66+64*
X,X$(2*X):NEXT:GOTO750
110 JX=JOYSTK(0):JY=INT(JOYSTK(1
)/10):JY=JY-(JY=5):IFJY<>LN THEN
PRINT@66+64*LN,X$(2*LN):SOUND100
,1
120 PRINT@66+64*JY,X$(2*JY+1);:I
FJY>2THEN130ELSEIFJX<32THENPRINT
": load  SAVE":LS=0ELSEPRINT": L
OAD  save":LS=1
130 IFPEEK(FB)AND1THENLN=JY:PRIN
T@331,DR:GOTO110ELSEON JY+1 GOTO
 150,390,560,710,740,110,770
140 '-----graphicom load/save
150 X$=X$(0):GOSUB810
160 GOSUB870:IFYN=0THEN100
170 GOSUB900:IFN=0THEN1020
180 GOSUB810:GOSUB880:IFYN=0THEN
100ELSEGOSUB250:IFSN<0THEN1020EL
SEIF LS THEN220
190 '-----load graphicom
200 PCLS1:SCREEN1:W=2:AD=&HE00:G
OSUB320:GOTO100
210 '-----save graphicom
220 SCREEN1:AD=&HE00:W=3:GOSUB32
0:IFSN=0THEN100
230 GET(216,162)-(255,191),GS,G:
PMODE4,5:SCREEN1:PUT(X1,Y1)-(X2-
2,Y2-2),GS,PSET:SN=0:AD=&H2600:W
=3:GOSUB320:GOTO100
240 '-----load graphicom directo
ry
250 PMODE4,5:PCLS1:SCREEN1
260 AD=&H2600:SN=0:W=2:GOSUB320
270 '-----select pix
280 X=INT(JOYSTK(0)/11):Y=INT(JO
YSTK(1)/13)
290 Y1=(Y-(Y>0))*32:X1=X*42+1:X2
=X1+41:Y2=Y1+31:FORC=0TO1:COLORC
:LINE(X1,Y1)-(X2,Y2),PSET,B:NEXT
300 IFPEEK(FB)AND1THEN280ELSESN=
Y*6+X-4:PMODE4,1:IFSN<0THENCLS:P
RINT"abort from graphicom":RETUR
NELSERETURN
310 '-----graphicom i/o,w=2/3=re
ad/write,tr=track,s=sector,a=add
ress,dk=dskcon
320 S=SN*24:TR=INT(S/18):S=S-(TR
*18)+1
330 IFTR>17 OR (TR=17 AND S>1)TH
ENS=S+2:IFS>18THENS=S-18:TR=TR+1
340 FORI=0TO23:A=AD+256*I:POKEPB
,W:POKEPB+1,DR:POKEPB+2,TR:POKEP
B+3,S:POKEPB+4,INT(A/256):POKEPB
+5,A-256*INT(A/256):EXEC PEEK(DK
)*256+PEEK(DK+1)
350 S=S+1:IFS>18THENS=1:TR=TR+1
360 IFTR=17 AND S=2THENS=4
370 NEXT:RETURN
380 '-----coco max load/save
390 X$=X$(2):GOSUB810
400 GOSUB870:IFYN=0THEN100
410 GOSUB810:GOSUB880:IFYN=0THEN
100ELSEIF LS THEN460
420 '-----load coco max
430 GOSUB900:IFN=0THEN1020ELSEPC
LS1:SCREEN1:LOADMF$(VAL(K$))+DR$
```

```
440 GOSUB810:PRINT"COPY SCREEN 2
 TO WORKING PIX?":GOSUB850:IF YN
 THENFORX=5TO8:PCOPY X TO X-4:NE
XT:GOTO100ELSE100
450 '-----save coco max
460 GOSUB810:LN=0:FORX=0TO3:PRIN
T@66+64*X,X$(2*X+14):NEXT
470 JX=JOYSTK(0):JY=INT(JOYSTK(1
)/20):IFLN<>JY THENPRINT@66+LN*6
4,X$(2*LN+14):SOUND100,1
480 PRINT@66+64*JY,X$(2*JY+15):I
FPEEK(FB)AND1THENLN=JY:GOTO470
490 ON JY+1 GOTO500,510,530,100
500 IFFREE(DR)>2THENT1(DR)=1:SCR
EEN1:SAVEM"TEMP/001"+DR$,&HE00,&
H25FF,&HA027:GOTO470ELSE1030
510 IFFREE(DR)>2THENT2(DR)=1:SCR
EEN1:FORX=1TO4:PCOPY X TO X+4:NE
XT:SAVEM"TEMP/002"+DR$,&H2600,&H
3DFF,&HA027:GOTO470ELSE1030
520 IFJY=3THEN100
530 GOSUB810:IFT1(DR)=0 OR T2(DR
)=0THEN1050ELSELINEINPUT"FILE NA
ME? ";F$:IF F$="" OR LEN(F$)>8 T
HEN1040
540 T1(DR)=0:T2(DR)=0:PCLS1:SCRE
EN1:LOADM"TEMP/001"+DR$:KILL"TEM
P/001"+DR$:PMODE4,5:PCLS1:SCREEN
1:LOADM"TEMP/002"+DR$:KILL"TEMP/
002"+DR$:SAVEM F$+"/MAX"+DR$,&HE
00,&H3DFF,&HA027:GOTO100
550 '-----standard load/save
560 X$=X$(4):GOSUB810
570 GOSUB870:GOSUB830:IFYN=0THEN
100
580 GOSUB810:GOSUB880:IFYN=0THEN
100ELSEIF LS THEN680
590 '-----load standard
600 GOSUB900:IFN=0THEN1020
610 '-----check file length
620 NA$=F$(VAL(K$))+DR$:OPEN"D",
1,NA$,1:FIELD1,1AS C$:R=1
630 GET#1,R:IFASC(C$)=255THEN650
640 GET#1,R+1:L=256*ASC(C$):GET#
1,R+2:L=L+ASC(C$):GET#1,R+3:A=25
6*ASC(C$):GET#1,R+4:A=A+ASC(C$):
SA=A:R=R+L+5:GOTO630
650 GET#1,R+3:E=256*ASC(C$):GET#
1,R+4:E=E+ASC(C$):EA=A+L-1:CLOSE
#1
660 IF EA-SA<>&H17FF THENCLS:PRI
NT"not a picture file":GOTO1020E
LSEPCLS1:SCREEN1:LOADMNA$:GOTO10
0
```

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```
670 '-----save standard
680 IFFREE(DR)<3THEN1030
690 GOSUB810:LINEINPUT"FILE NAME
/EXT? ";FI$:IFLEN(FI$)>13 OR FI$
=""THEN100ELSESCREEN1:SAVEM FI$+
DR$,&HE00,&H25FF,&HA027:GOTO100
700 '-----see working pix
710 SCREEN1:GOSUB830
720 IFPEEK(FB)AND1THEN720ELSE100
730 '-----pix drive,dx=number of
 drives
740 DX=2:DR=DR+1:IFDR=DX THENDR=
0
750 DR$=":"+MID$(STR$(DR),2,1):P
RINT@331,DR:SOUND100,1:GOTO110
760 '-----quit
770 X$=X$(12):GOSUB810
780 PRINT"ARE YOU SURE?":GOSUB85
0
790 IF YN THENUNLOAD:CLS:END ELS
E100
800 '-----title display
810 CLS:X=LEN(X$):Y=INT((32-X)/2
):PRINTSTRING$(Y,"*")X$STRING$(3
2-X-Y,"*")
820 '-----fire button debounce
830 FORX=0TO100:NEXT:IFPEEK(FB)A
ND1THENRETURNELSE830
840 '-----prompts
850 IFJOYSTK(0)<32THENPRINT@135,
"yes  NO":YN=1ELSEPRINT@135,"YES
  no":YN=0
860 IFPEEK(FB)AND1THEN850ELSE830
870 PRINTX$(LN*2)" DISK IN DRIVE
"DR"?":GOTO850
880 PRINT"READY TO ";:IF LS THEN
PRINT"SAVE?":GOTO850ELSEPRINT"LO
AD?":GOTO850
890 '-----disk file search
900 CLS:PRINT"SEARCHING...":N=0:
FORZ=3TO11:DSKI$ DR,17,Z,B$(0),B
$(1):FORQ=0TO1:FORW=0TO3:K$=MID$
(B$(Q),W*32+1,32):IF ASC(K$)=255
THENZ=99:W=Z:Q=Z:GOTO950
910 IFASC(K$)=0THEN950ELSEON LN+
1 GOTO920,930,940
920 IFMID$(K$,12,1)=CHR$(1) AND
LEFT$(K$,11)="PICTURESGCM"THENN=
1:GOTO950ELSE950
930 IFMID$(K$,9,3)="MAX" AND MID
$(K$,12,1)=CHR$(2)THENN=N+1:F$(N
)=LEFT$(K$,8)+"/MAX":GOTO950ELSE
950
940 IFMID$(K$,12,1)=CHR$(2) AND
MID$(K$,9,3)<>"MAX"THENN=N+1:F$(
N)=LEFT$(K$,8)+"/"+MID$(K$,9,3)
950 NEXTW,Q,Z:IFN=0 AND LN=0THEN
CLS:PRINT"not a graphicom disk":
RETURN
960 IFLN=0THENRETURN
970 IFN=0THENCLS:PRINT"no pictur
es":RETURN
980 CLS:Q=1:FORZ=1TO3:FORW=1TO30
:PRINT@(W-1)*16,"";:PRINTUSING"#
#";Q;:PRINT"."F$(Q):IFQ=N THENW=
99:Z=W
990 IFINT(Q/30)=Q/30THENPRINT@48
0,"CONTINUE...";:LINEINPUTK$:NEX
TZ
1000 Q=Q+1:NEXTW,Z:PRINT@480,"";
:INPUT"NUMBER OF PIX TO LOAD";K$
:IFK$=""ORVAL(K$)<1 OR VAL(K$)>N
 THENN=0:GOTO970ELSERETURN
1010 '-----error messages
1020 SOUND50,10:FORX=0TO1000:NEX
T:GOTO100
1030 CLS:PRINT"no room on disk":
GOTO1020
1040 CLS:PRINT"improper file nam
e":GOTO1020
1050 CLS:PRINT"no temporary file
";:IFT1(DR)=0 AND T2(DR)=0THENPR
INT"s"ELSEIFT1(DR)=0THENPRINT" 1
"ELSEPRINT" 2"
1060 GOTO1020
```

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Crash-Proof It!

By Terry Wilson

After seeing a letter in "Downloads" from a reader who was having problems restoring a damaged Track 17 on a disk, I wrote this program, *Crashproof*. It is very short and only uses up one granule. I used to keep *Zapper* on every disk to store and retrieve directories, but at a cost of five granules.

Crashproof requires a 64K disk system. A copy should be kept on every disk for convenience. The program does four things: It changes the `DSKI$`, `DSKO$`, `DSKINI` and `BACKUP` commands to operate at 36 tracks instead of 35. It keeps a spare copy of the disk directory on Track 36. It can recover directories with logical errors and last, but most important, it can recover directories with physical errors.

After the conclusion of an input/output session, I type `RUN"CP"` and press ENTER at the main menu. In a few seconds, Track 17 is safely stored at Track 36. If you maintain directories with more than 40 files it is advisable to change the '8' in lines 150 and 220 to 11. A logical crash can be repaired in about a minute and a physical crash in about five mintues.

It is important to note to beginners that all disks must have been formatted to 36 tracks before any files are stored on a disk. After choosing Option 1, any subsequent `DSKINI0` formats 36 tracks. Therefore, a `RUN"CP"` only has to be done once to format a new box of disks. After all disks are formatted, `LOAD"CP"` again and `RUN1010`. Pressing any key puts a copy of *Crashproof* on your disk. Option 2 performs the transfer of Track 36 to Track 17; Option 3 allows a back up of all 36 tracks to another disk. After this operation is complete, `RUN"CP"` again and choose Option 2. As with any new utility, practice on an insignificant disk first.

Crashproof has been written from information gathered from previous issues of RAINBOW, so no big feather in my cap. However, thanks to this information, *Crashproof* is a very useful, up-to-date utility.

(You may contact the author of this program with any questions you have at 3436 Casa Grande, Baton Rouge, LA 70814, phone 504-272-4652. Please enclose an SASE when writing.) ☐

(Terry Wilson, a former air traffic controller, is a plant operator for the Arcadian Corporation in Geismar, Louisiana. Having enjoyed tutoring his wife, Donna, in FORTRAN at LSU, he has also studied PASCAL.)

90 132
220 86
END 112

Editor's Note: If you have the newer Radio Shack Disk BASIC 1.1 ROM, then you will need to change the POKE addresses in lines 60 and 200. Change the values in Line 60 from &HD446 and &HD1B0 to &HD534 and &HD29D respectively. Also, change the values in Line 200 from &HD572 and &HD595 to &HD65F and &HD682 respectively.

The listing: CRASHPRF

```
1 '******************************
2 '*       CRASH PROOF IT!!     *
3 '*       TERRY L. WILSON      *
4 '*      3436 CASA GRANDE      *
5 '*     BATON ROUGE LA.        *
6 '*    ZIP CODE 70814          *
7 '******************************
8 '
9 CLEAR999
10 DATA 26,80,190,128,0,183,255,
222,166,128,183,255,223,167,31,1
40,224,0,37,241,57
20 FORI=1TO21:READA:A$=A$+CHR$(A
):NEXTI
30 P=VARPTR(A$)+1
40 POKEP,126
50 EXECP'NOW IN 64K
60 POKE&HD446,&H23:POKE&HD1B0,&H
24'ENABLES TRACK36
70 CLS:PRINT@39,"CRASH PROOF IT!
!!"
80 PRINT:PRINT"  (1) FORMAT NEW
DISK TO 36            TRACKS":PRI
NT"  (2) RECOVER CRASHED DISK":P
RINT"       (COPY TRACK 36 TO 17)
"
90 PRINT"  (3) STILL BAD??":PRIN
T"       (OPTION #2 FAILED)"
100 PRINT:PRINT"       ENTER YOUR
CHOICE OR"
110 PRINT:PRINT"        PRESS <ENT
ER> TO":PRINT"  COPY TRACK 17 TO
 TRACK 36"
120 INPUT"                  ";A:IFA>3T
HEN70
130 CLS:ON A GOTO 170,210,230
```

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```
140 PRINT"     IF THIS DISK IS CR
ASHED":PRINT"        CRASH PROOF W
ILL CATCH IT":DIR
150 FOR X=2 TO 8:DSKI$ 0,17,X,A$
,B$:DSKO$ 0,35,X,A$,B$:PRINT"TR.
 17 SEC.";X"TO TR. 36 SEC.";X:PR
INTA$;B$:NEXT
160 PRINT"DIRECTORY STORED AT TR
ACK 36":FORX=1 TO 1000:NEXT:GOTO
70
170 CLS:PRINT@73,">>>CAUTION<<<"
:PRINT:PRINT" YOU ARE ABOUT TO C
LEAN THAT     DISK AND FORMAT IT
 TO 36 TRACKS"
180 INPUT"     SURE";X$:IFLEFT$(
X$,1)<>"Y"THEN70
190 PRINT" INSERT DISK TO BE FOR
MATED":PRINT"        PRESS ANY KE
Y":EXEC44539
200 POKE&HD572,&H24:POKE&HD595,&
H24:DSKINI0
210 CLS:PRINT"INSERT BAD DISK IN
TO DRIVE 0":LINEINPUT"  PRESS <E
NTER> WHEN READY";X$
220 FOR X=2TO 8:PRINT"TRACK";X:D
SKI$ 0,35,X,A$,B$:DSKO$ 0,17,X,A
$,B$:PRINTA$:PRINTB$:NEXT:PRINT"
DIRECTORY RESTORED":FORX=1TO460:
NEXT:GOTO70
230 CLS:PRINT"THIS OPTION CREATE
S A BACKUP":PRINT"COPY OF THE CR
ASHED DISK. THE":PRINT"BACKUP0 C
OMMAND HAS BEEN CHANGED";:PRINT"
TO BACKUP ALL 36 TRACKS SO WHEN"
:PRINT"YOU HAVE MADE A NEW COPY,
 YOU":PRINT"MUST RUN CRASHPROOF
AND CHOOSE"
240 PRINT"OPTION #2 TO RESTORE T
HE DIREC- TORY ON YOUR NEW COPY.
"
250 PRINT:PRINT"TYPE 'YES' IF YO
U ARE READY TO  BACKUP0"
260 INPUT"          READY";X$:IF
 X$="YES"THENBACKUP0
270 GOTO70
1000 ' USE A RUN1010 AFTER YOU
       HAVE FORMATED ALL YOUR
       NEW DISK
1010 CLS:PRINT@40,"CRASH PROOF I
T!!!":PRINT@99,"SAVE A COPY TO E
VERY DISK":PRINT@137,"PRESS ANY
KEY":EXEC44539:IFFREE(0)>0THENSA
VE"CP":PLAY"G":GOTO1010
1020 PRINT"        THIS DISK IS F
ULL":EXEC44539:GOTO1010
```

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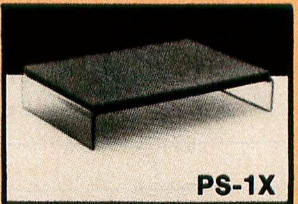

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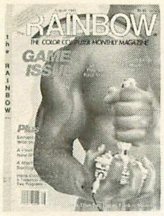

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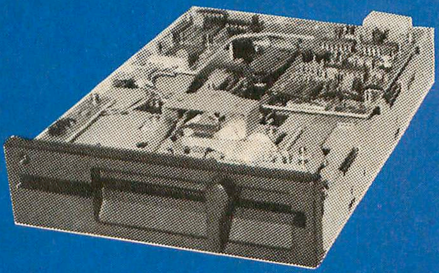

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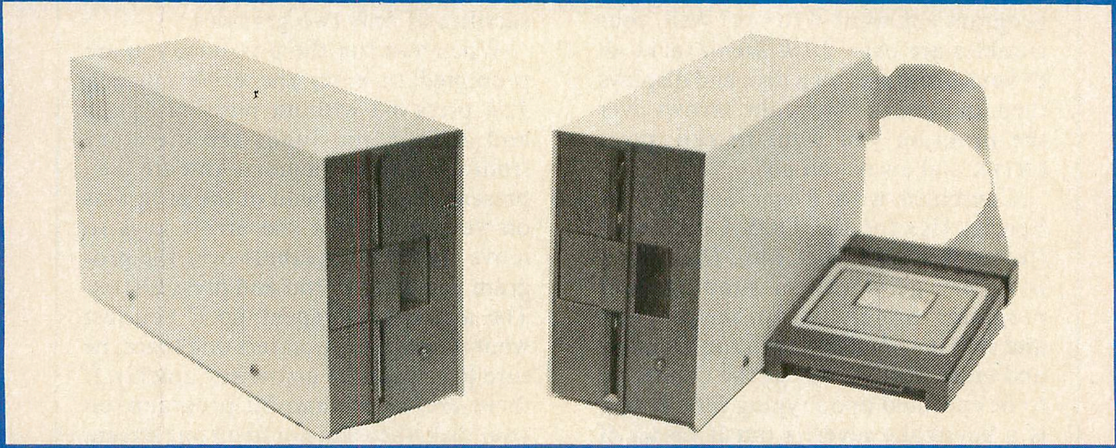

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16K
Disk

An Easy Way to Run Your Programs

By Andrew Dater

How many times have you typed in `DIR` and frantically hit the SHIFT-@ keys trying to find a program you wanted to run? Well, your troubles are over. *Disk Menu* takes all of your programs on a disk and displays them in a menu. Move the arrows over the program you want to run, press ENTER and away you go!

Combined with Roger Schrag's "A Special Use for the DOS Command" (November 1984, Page 140), *Disk Menu* is a very easy way of running your programs. Simply type in the program and save it as *MENU*, then run *Dosstart* and enter `RUN"MENU"` as the command to be executed upon typing `DOS`. It sure is a keystroke saver! I put it on all of my disks, especially my RAINBOW ON TAPE disks. I just type in `DOS` and get a menu of the programs from THE RAINBOW all ready to run. *Disk Menu* only takes up one granule on the disk, so with it and the `DOS` command, you can save yourself a lot of typing with the sacrifice of only two granules.

When you run the program, you are prompted to enter the drive number. Just press 0-3 without pressing ENTER and *Disk Menu* loads the directory from the disk to memory. You are then presented with a menu of the programs on your disk. Use the arrow keys to move the "> <" symbols over the program you want to run and press ENTER. The arrow keys repeat, so if you just want to move the pointers one space, be sure to release the arrow key quickly. If there are more than 30 programs on your disk, they will not fit on one screen, so press 'M' (for "more") to switch between screens. To switch disks or drives, press CLEAR to restart the program.

You can also get the free granules on your disk very easily: press 'F' and it displays how many are free. Press any key to get back to the menu.

(Questions about this program may be sent to the author at 2847 La Mirada, Medford, OR 97504, phone 503-779-4618. Please include an SASE when writing.) ☐

(Andy Dater is currently a senior at Phoenix High School in Medford, Oregon, and has been programming his CoCo for four years. He is involved in the study of computers and business and their interrelationship. He is president of his school's chapter of the Future Business Leaders of America.)

130 101
330 250
END 155

The listing: DISKMENU

```
10 'COCO DISK MENU
20 '(C) 1985 ANDY DATER
30 PMODE0:PCLEAR1:CLEAR5000
40 DIMT$(11,7),N$(68),TP(68)
50 CLS4:PRINT@9,"COCO DISK MENU"
;:PRINT@47,"BY";:PRINT@75,"ANDY
DATER";:PRINT@103,"COPYRIGHT (C)
 1985";:PRINT@162,"PRESS 0-3 FOR
 DISK DIRECTORY";
60 DN$=INKEY$:IFDN$<>"0"ANDDN$<"
1"ORDN$>"3"THEN60ELSEDR=VAL(DN$)
70 PRINT@226,"READING DIRECTORY
OF DRIVE "DN$;
80 N=1:FORX=3TO11:DSKI$DR,17,X,A
$,B$:C$=A$+LEFT$(B$,127):FORI=0T
O7:T$(X,I)=MID$(C$,I*32+1,32):C1
=ASC(T$(X,I)):IFC1=255THEN100ELS
EIFC1=0THEN90ELSEN$(N)=LEFT$(T$(
X,I),12):TP(N)=ASC(MID$(T$(X,I),
12,1)):N=N+1:IFN=69THEN100
90 NEXTI,X
100 N=N-1:FORX=1TON:N$(X)=LEFT$(
N$(X),8)+"."+MID$(N$(X),9,3):NEX
T
110 CLS
120 IFN<=30THENPP=1:N1=N
130 IFN>30THENPP=2:N1=30
140 IFN>60THENPP=3:N1=30
150 FORX=1TON1:PRINT" "N$(X),:NE
XTX
160 IFPP=2ORPP=3THENPRINT@480,"P
RESS <M> FOR MORE...";
170 L$=">":R$="<":P=0:Y=1
180 PRINT@P,L$;:PRINT@P+13,R$;
190 FORX=338TO345:POKEX,255:NEXT
X
200 IFPEEK(338)=191THEN390
210 IFPEEK(339)=191THENCLEAR:GOT
O40
220 IFPEEK(341)=247THEN350
230 IFPEEK(342)=247THEN360
240 IFPEEK(343)=247THEN370
250 IFPEEK(344)=247THEN380
260 IFPEEK(344)=254THEN290
270 IFPEEK(343)=253THEN300
280 GOTO200
290 CLS:PRINTFREE(DR)"FREE GRANU
LES ON DRIVE"DR:PRINT:PRINT"PRES
S ANY KEY TO CONTINUE":EXEC44539
:GOTO110
300 IFPP=2ANDY=1THENCLS:FORX=31T
ON:PRINT" "N$(X),:NEXT:PRINT@480
,"PRESS <M> FOR MORE...";:Y=2:P=
0:N1=N-30:GOTO180
310 IFPP=2ANDY=2THENY=1:P=0:N1=3
0:GOTO110
320 IFPP=3ANDY=1THENCLS:FORX=31T
O61:PRINT" "N$(X),:NEXT:PRINT@48
0,"PRESS <M> FOR MORE...";:Y=2:P
=0:N1=N-59:GOTO180
330 IFPP=3ANDY=2THENCLS:FORX=62T
ON:PRINT" "N$(X),:NEXT:PRINT@480
,"PRESS <M> FOR MORE...";:Y=3:P=
0:N1=N-61:GOTO180
340 IFPP=3ANDY=3THENY=1:P=0:N1=3
0:GOTO110
350 IFP<17THEN180ELSEP=P-32:PRIN
T@P+32," ";:PRINT@P+45," ";:GOTO
180
360 IF P/16=>(N1-2)THEN190ELSEP=
P+32:PRINT@P-32," ";:PRINT@P-19,
" ";:GOTO180
370 P=P-16:IFP<0THENP=0:GOTO180E
LSEPRINT@P+16," ";:PRINT@P+29,"
";:GOTO180
380 IF P/16=>(N1-1)THEN190ELSEP=
P+16:PRINT@P-16," ";:PRINT@P-3,"
 ";:GOTO180
390 F=P/16+(Y-1)*30+1:F$=N$(F)+"
:"+DN$:TP=TP(F)
400 CLS
410 IFTP=0THENLOADF$,R
420 IFTP=2THENLOADMF$:CLEAR200:P
OKE&HFF40,0:EXEC:END
430 CLS:PRINT"IS FILE: "F$" A BA
SIC":PRINT"PROGRAM? (Y/N)"
440 I$=INKEY$:IFI$="Y"THENLOADF$
,R ELSEIFI$="N"THENCLEAR200:ENDE
LSE440
```

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Alleviate your hand-assembling problems!

Defeat de Bugs

By Mike Dean

Do you have a lot of assembly language listings, but do not have an editor/assembler? Are you hoping to purchase an editor/assembler in the future, but won't have the extra money to do so for some time? If you answered "yes" to either of these questions, then read on.

Debug is a utility that can display 30 bytes and their corresponding characters on the screen at any address. It can also make hard copy printouts in listing form, so if any of your computer pals want a listing, the program can easily generate one. *Debug* is essentially an address modifier. Anyone who has worked with the debug program on the Model III should be familiar with this version.

(Mike Dean is an honor student at Knoxville High School in Knoxville, Illinois. He has worked with computers for six years and is a self-taught programmer.)

Debug requires a 16K Extended Color BASIC computer. No prior loading instructions are required unless the machine code you're going to type in requires them. To make sure the machine code starts after your BASIC program, type in the command `PRINT PEEK(27)*256+PEEK(28)`; this returns the end address for the program. If the address is where the code will be placed,

Sample Run

```
8000: 45 58 8E 80 DE CE
8006: 01 2A C6 0A BD A5
800C: 9A 8E B2 77 AF 43
8012: AF 48 8E 89 4C BF
8018: 01 0D 9E 8A BF 01
801E: 12 BD 82 9C CC 2C
8024: 05 DD E6 8E 01 3E
802A: 9F B0 CE B4 4A C6
8030: 0A EF 81 5A 26 FB
8036: 86 7E B7 01 9A 8E
```

I suggest using the `PCLEAR` command to move the program back in memory.

The following keys are used in the program.

Key	**Operation**
N	Restarts program for a *N*ew address
J	*J*ump to specified address
;	Go to the next page of addresses
–	Go to the previous page of addresses
S	*S*aves machine code with the `CSAVEM` command
L	*L*oads machine code into memory with the `CLOADM` command
P	*P*rints a listing of machine code to the screen or printer
A-F 0-9	Hexadecimal numbers used when modifying addresses
Arrow keys	Move cursor in modification mode

When you have finished typing in *Debug*, save it since a possibility exists that the code you may JUMP to might not let you return to *Debug*. After saving *Debug*, type `RUN` and press ENTER. The credits appear and the program asks the address at which you would like to start. You must respond in hexadecimal.

After pressing ENTER, the address you requested will be in the upper left-hand corner of the screen. The contents of each address are displayed with each corresponding address. Press the semicolon (;) key and the next page of addresses will appear on the screen. Press the minus (–) key and the address typed in at the start of the program will be the address in the upper left corner.

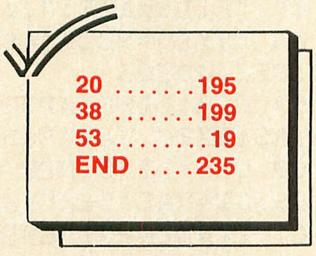
Find an assembly listing in an issue of THE RAINBOW and type in the Hex numbers only. Once you reach the end of the page, a tone will sound. This indicates that you can either examine your typing accuracy or go to the next page. When you are finished typing in the code, press the 'S' key. Type the start address at the first prompt, press ENTER and type the ending address. Next, press ENTER and type the execution address. The program then asks for the filename. Type an appropriate name and press ENTER; the machine code will then be saved. The program goes back to the starting address you specified and displays the memory contents. To test your program save, press the 'L' key. Type in the filename or press ENTER for the next file. The file will be loaded and you will go back to the starting address of the file just loaded.

For a better chance of finding typing errors, I have incorporated a print feature for those with printers. All you have to do is press the 'P' key and let the printer do the rest. The printout duplicates the format used on the screen. This makes it easy to type in from a *Debug*-generated listing.

To experiment with *Debug*, load it and type in Listing 2 — just type Hex numbers on the keyboard. The graphics that are produced should be easier to test if you have a Hex to binary chart.

Debug has alleviated my hand-assembly problems. Once you get used to the format, listings can be entered in a matter of minutes. I have used *Debug* to type in the first two installments of *Screen 51* by Chris Bone and R. Bartly Betts. (These installments can be found in the December 1984 and January 1985 issues of RAINBOW.) Use *Debug* as much as possible. You'll be amazed at the accuracy compared to typing `DATA` statements.

(Questions about *Debug* may be sent to Mike at R.R. 1, Box 117, Knoxville, IL 61448, phone 309-289-6987. Please include an SASE for a reply when writing.) ☐



20 195
38 199
53 19
END 235

The listing: DEBUG

```
1 CLS:PRINT@197,"MACHINE LANGUAG
E DEBUG";
2 PRINT@233,"VERSION  02.02";
3 PRINT@259,"BY MIKE DEAN  JANUA
RY 1985";
4 FORSW=0TO1500:NEXT
5 CLS:LINEINPUT"ADDRESS (HEX):";
A$:LO=VAL("&H"+A$):CLS:IFLO>6544
6THENLO=65446
6 ZV=LO:FORDP=0TO448STEP32:ZQ$=H
EX$(ZV)
7 IFLEN(ZQ$)<4THENZQ$="0"+ZQ$:GO
TO7
8 PRINT@DP,ZQ$":";
9 ZV=ZV+6:NEXT:ZV=LOC
10 FORDP=6TO454STEP32
11 FORQP=DP TODP+16STEP3
12 ZQ$=HEX$(PEEK(ZV))
13 IFLEN(ZQ$)<2THENZQ$="0"+ZQ$
14 PRINT@QP,ZQ$;:ZV=ZV+1:NEXTQP,
DP:ZV=LOC
15 ZV=LOC:FORDP=1050TO1498STEP32
:FORQP=0TO5
16 POKEQP+DP,PEEK(ZV):ZV=ZV+1:NE
XTQP,DP
17 AP=0:BP=6:PO=LO:PX=1050
18 PRINT@(AP+BP),STRING$(2,207);
19 A$=INKEY$
20 IFA$="N"THENRUN
21 IFA$=";"THENLO=LO+90:IFLO>654
46THENLO=65446:GOTO6ELSE6
22 IFA$="-"THENLO=LO-90:IFLO<0TH
ENLO=0:GOTO6ELSE6
23 IFA$<>CHR$(9)THEN26
24 GOSUB43:PRINT@(AP+BP),ZQ$;:BP
=BP+3:IFBP>22THENBP=6:AP=AP+32:P
O=PO+1:PX=PX+27:GOTO44
25 PO=PO+1:PX=PX+1:GOTO18
26 IFA$<>CHR$(8)THEN29
27 GOSUB43:PRINT@(AP+BP),ZQ$;:BP
```

```
=BP-3:IFBP<6THENBP=21:AP=AP-32:P
O=PO-1:PX=PX-27:GOTO45
28 PO=PO-1:PX=PX-1:GOTO18
29 IFA$<>CHR$(10)THEN32
30 GOSUB43:PRINT@(AP+BP),ZQ$;:AP
=AP+32:IFAP>448THENAP=448:GOTO18
31 PO=PO+6:PX=PX+32:GOTO18
32 IFA$<>"^"THEN35
33 GOSUB43:PRINT@(AP+BP),ZQ$;:AP
=AP-32:IFAP<0THENAP=0:GOTO18
34 PO=PO-6:PX=PX-32:GOTO18
35 IFA$="L"ORA$="S"THEN46ELSEIFA
$="J"THEN59ELSEIFA$="P"THEN60
36 IFA$=>"0"ANDA$<="9"ORA$=>"A"A
NDA$<="F"THENPRINT@(AP+BP),A$;:B
P=BP+1:GOTO38
37 GOSUB43:PRINT@(AP+BP),ZQ$;:GO
TO18
38 B$=INKEY$:IFB$=""THEN38
39 IFB$=>"0"ANDB$<="9"ORB$=>"A"A
NDB$<="F"THENPRINT@(AP+BP),B$;:E
LSE38
40 POKEPO,VAL("&H"+(A$+B$)):POKE
PX,VAL("&H"+(A$+B$)):GOSUB43:PRI
NT@(AP+BP-1),ZQ$;:POKEPX,VAL("&H
"+ZQ$)
41 BP=BP+2:IFBP>22THENBP=6:AP=AP
+32:PX=PX+27:PO=PO+1:IFAP>448THE
NSOUND128,3:GOTO44ELSE44
42 PO=PO+1:PX=PX+1:GOTO18
43 ZQ$=HEX$(PEEK(PO)):IFLEN(ZQ$)
=1THENZQ$="0"+ZQ$:RETURNELSERETU
RN
44 IFAP>448THENAP=448:BP=21:PO=L
O+89:GOTO18ELSE18
45 IFAP<0THENAP=0:BP=6:PO=LO:GOT
O18ELSE18
46 CLS:IFPEEK(49152)=68THENDV=1E
LSEDV=-1
47 IFA$="L"THEN56
48 PRINT"      RESPOND IN HEXADEC
IMAL"
49 LINEINPUT"START ADDRESS:";S$:
S=VAL("&H"+S$)
50 LINEINPUT"ENDING ADDRESS:";E$
:E=VAL("&H"+E$)
51 LINEINPUT"EXECUTION ADDRESS:"
;D$:D=VAL("&H"+D$)
52 LINEINPUT"FILENAME:";F$
53 IFDV=1THEN55
54 PRINT"PRESS PLAY&RECORD.":PRI
NT"PRESS ANY KEY WHEN READY":EXE
C&HA171:CSAVEMF$,S,E,D:LO=S:CLS:
GOTO6
55 SAVEM F$,S,E,D:LO=S:CLS:GOTO6
56 IFDV=-1THEN58
57 LINEINPUT"FILENAME:";F$:LOADM
 F$:LO=PEEK(487)*256+PEEK(488):C
LS:GOTO6
58 PRINT"PRESS PLAY AND ENTER TH
E","FILENAME:";:LINEINPUTF$:CLOA
DM F$:LO=PEEK(487)*256+PEEK(488)
:CLS:GOTO6
59 CLS:LINEINPUT"ADDRESS (HEX):"
;A$:EXEC VAL("&H"+A$):GOTO5
60 CLS:LINEINPUT"START ADDRESS";
S$:ST=VAL("&H"+S$)
61 LINEINPUT"END ADDRESS";E$:EN=
VAL("&H"+E$):LINEINPUT"sCREEN OR
 pRINTER? ";DV$:IFDV$="P"THEN DV
=-2ELSEDV=0
62 IF(EN-ST)/6=INT((EN-ST)/6)THE
N63ELSEEN=EN+1:GOTO62
63 FORDP=ST TO EN STEP6:ZQ$=HEX$
(DP)
64 IFLEN(ZQ$)<4THENZQ$="0"+ZQ$:G
OTO64
65 PRINT#DV,ZQ$":";
66 FORDD=DP TODP+5
67 ZQ$=HEX$(PEEK(DD)):IFLEN(ZQ$)
<2THENZQ$="0"+ZQ$
68 PRINT#DV," "+ZQ$;
69 NEXTDD:PRINT#DV,"":NEXTDP
70 PRINT"PRESS A KEY TO CONTINUE
":EXEC&HA171:LO=ST:CLS:GOTO6
```

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AUTO-EXECUTING YOUR TAPE PROGRAMS

By Harold Nickel

While I have had my CoCo, I have come to appreciate its abilities. One I missed having, though, is the ability to load a program from tape and execute it all with one command. Without this, you can't "chain" programs (have one program execute another). Techniques have been written giving assembler programs the ability to auto-execute, but you are still stuck typing in `CLOAD` and `RUN` for your BASIC stock.

The following machine code provides this ability; it differs from the assembler techniques. With assembler auto-executes, the program loaded stores values into memory locations that cause it to begin executing. The machine language program runs itself. With *Crun*, the logic is external to the program. Like a BASIC command, executing the *Crun* code is done either manually or from a currently running program.

Modifying CLOAD

Since much of the logic I wanted to use was already a part of the `CLOAD` command, I decided to use a variation of that logic for *Crun*. The first step was to determine how `CLOAD` worked.

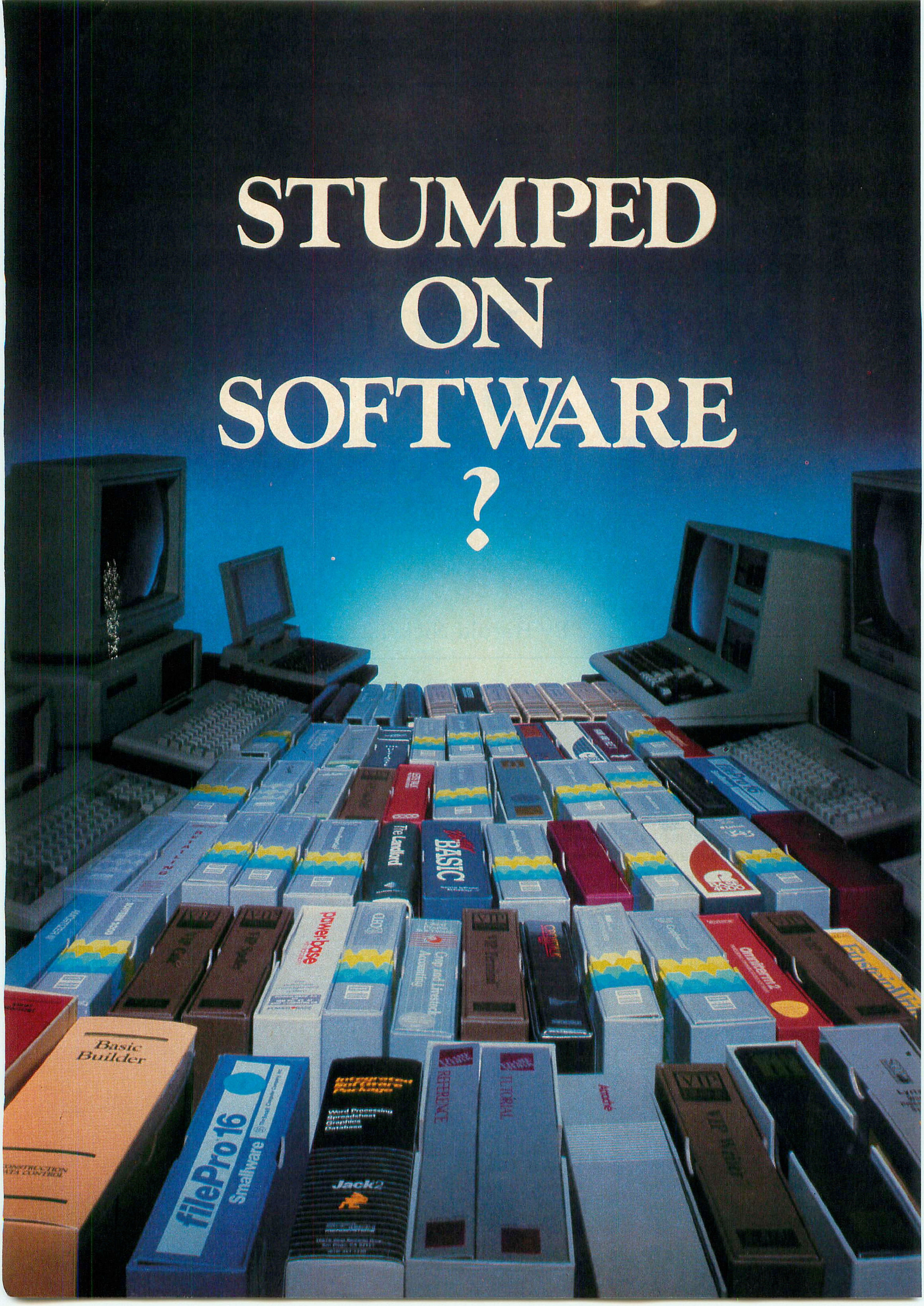
I used the program *Memdump* (Listing 1) to print the machine code for `CLOAD`. *Memdump* prints selected areas

31 249
END 39

Listing 1: MEMDUMP

```
0 'FORMATTED HEX MEMORY DUMP
1 CLS
2 M$=""
10 INPUT"ENTER TITLE: ";T$
11 IF T$="Q" THEN END
12 INPUT"ENTER START (HEX): ";S$
13 INPUT"ENTER END ADDRESS: ";E$
14 PRINT
20 INPUT"(S)CREEN OR (P)RINT): "
;O$
21 IF O$="S" THEN O=0:PRINT:GOTO
25
```

(Harold Nickel lives in Massachusetts and has been working in data processing on mainframe computers for nine years. He has worked as a systems analyst, an instructor in systems design and a capacity planner. His first microcomputer experience was putting together a "SOL-20" back in 1979.)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Software pictured not necessarily available for the Color Computer.

of memory to either the screen or a printer. (I use a Microline 82A printer.) It prints memory in hexadecimal with 8 bytes per line for the screen display and 16 bytes per line for the printed output. Each line is preceded with the first byte's address. Printed output is double-spaced to allow room for notations. It also allows each dump to be titled for future reference.

After printing the `CLOAD` code, I interpreted it into assembler instructions using a 6809 assembly language book. I selected the portion of `CLOAD` that loads BASIC files and wrote it as a separate machine language routine.

To transform this routine into *Crun*, it had to run the newly loaded file. It does this by storing the values 'R', 'U' and 'N' in the keyboard buffer, then jumping to the command execution logic. This simulates the entry of the `RUN` command from the keyboard and causes the program to be executed.

```
22 IF O$="P" THEN O=-2:PRINT:GOT
O 26
23 PRINT:PRINT"ENTER S OR P":GOT
O 20
25 CLS:S=8:GOTO 30
26 PRINT:PRINT"READY PRINTER.":P
RINT"PUSH ENTER WHEN READY."
27 S=16:M$="                "
28 INPUT O$
29 IF O$="Q" THEN GOTO 70
30 PRINT#O,M$;T$:PRINT#O," ":L=2
31 FOR A=VAL("&H"+S$) TO VAL("&H
"+E$) STEP S
32 PRINT#O,M$;
33 IF LEN(HEX$(A))<4 THEN FOR P=
LEN(HEX$(A))+1 TO 4:PRINT#O,"0";
:NEXT P
35 PRINT#O,HEX$(A);" : ";
40 FOR SA=0 TO S-1
41 PRINT#O," ";
42 IF LEN(HEX$(PEEK(A+SA)))<2 TH
EN PRINT#O,"0";
45 PRINT#O,HEX$(PEEK(A+SA));
50 NEXT SA
55 PRINT#O,""
56 IF O=-2 THEN PRINT#O," ":GOTO
 65
60 L=L+1
61 IF L<15 THEN GOTO 65
62 T$=INKEY$:IF T$="" THEN GOTO
62
63 L=0
65 NEXT A
70 PRINT
71 INPUT"MORE ?";O$
72 IF O$="YES" THEN GOTO 1
73 IF O$="Y" THEN GOTO 1
80 CLS
81 END
```

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The final version of *Crun* is presented in Listing 2. Not having an assembler, the code is shown in a three-column table rather than as an assembler program. The first column contains the actual machine code. The second column contains the assembler instruction associated with each line's function. The third column contains comments to help interpret the function being performed.

Using *Crun*

I used the program in Listing 3 to install the *Crun* code. *Crun* takes 102 bytes of memory. The Variable A contains the address of the start of *Crun*. This value, therefore, must be less than or equal to the highest address in RAM minus 101. The CLEAR statement keeps the routine from being written over. Its address value should be less than or equal to the value used in Variable A.

> ***"Since much of the logic I wanted to use was already a part of the CLOAD command, I decided to use a variation of that logic for Crun. The first step was to determine how CLOAD worked."***

Once installed, *Crun* can be called by using the EXEC command with the start address. Since the logic used is similar to that of CLOAD, it can also be used with a filename. Simply follow the EXEC command and address with either the filename in quotes when entering it through the keyboard, or as a variable value if executed from a program.

One use I have found for *Crun* is to equip each of my program tapes with a directory program (Listing 4). I generally keep a few tapes as a program library containing a number of BASIC programs. The *TapeDir* program provides a list of all programs on a tape, and the ability to load and run them from a menu.

TapeDir first protects the highest 102 bytes of RAM (my CoCo has 32K) and pokes in *Crun*. It then displays the program names on the tape. You can select one from the menu by pressing its letter (or exit *TapeDir* with the SHIFT-CLEAR keys). The selected program will be loaded and run. I use *TapeDir* itself as one of the selections. Then, if the program I want is not on the first tape, I can insert a new tape and select *TapeDir* to display its menu.

Since I add programs to my tapes periodically, I wrote *TapeDir* so that adding new program names would not increase its length. The new name is added as one of the T$ values. Names with less than eight characters are padded with blanks. The new directory can then be saved over the old one without writing into the next file on tape.

An additional technique I use is to place a tape header file on each tape. It consists of one comment line and is always the first file on a tape (before *TapeDir*). This lets me position the tape exactly at the beginning of *TapeDir*, using SKIPF, when I want to save a new menu. ☐

Listing 2: CRUN

```
Machine      Assmbler
 Code         Instr.      Description
---------    --------    -----------

0F 78          CLR       Flag CLOSE
32 62          LEAS      Clear Stack
BD A5 C5       JSR       Evaluate Filename
BD A6 48       JSR       Locate the File
7D 01 E4       TST       Check If Binary
26 05          BNE       Jump If Not Binary
B6 01 E2       LDA       Check If Basic
27 03          BEQ       Jump If Basic
7E A6 16       JMP       Jump to FM Error
BD AD 19       JSR       Do NEW
BD A7 7C       JSR       Read File Leader
9E 19          LDX       X=Program-Area Ptr
9F 7E          STX       Cassette-Buffer Ptr=X
DC 7E          LDD       D=Cassette-Buffer Ptr
4C             INCA      Bump Cassette-Buffer Ptr MSB
BD AC 37       JSR       Do Memory Check
BD A7 0B       JSR       Read a Block
26 34          BNE       Jump If I/O Error
96 7C          LDA       A=Block Type
27 30          BEQ       Jump If Header Block
2A ED          BPL       Loop If Data Block
9F 1B          STX       Save Buffer Ptr as End of Prog.
BD A7 E9       JSR       Turn Off Cassette
8E AB EC       LDX       X=O.K. Message
BD B9 9C       JSR       Display O.K. Message
BD AD 21       JSR       Reset Basic Memory Ptrs
BD AC EF       JSR       Reset Basic Line Ptrs
BD 01 82       JSR       Call Extended Basic Link
8E 02 DD       LDX       X=Start of Input Buffer
86 52          LDA       A='R'
A7 80          STA       Save 'R' in Buffer
86 55          LDA       A='U'
A7 80          STA       Save 'U' in Buffer
86 4E          LDA       A='N'
A7 80          STA       Save 'N' in Buffer
6F 84          CLR       Flag End of Input
C6 04          LDB       B=Length of Input
8E 02 DC       LDX       X=Start of Input minus 1
4F             CLRA      Signal No Break Key
7E AC 7F       JMP       Jump to Command Mode
BD AD 19       JSR       Do NEW
7E A6 19       JMP       Jump to Display I/O Error
```

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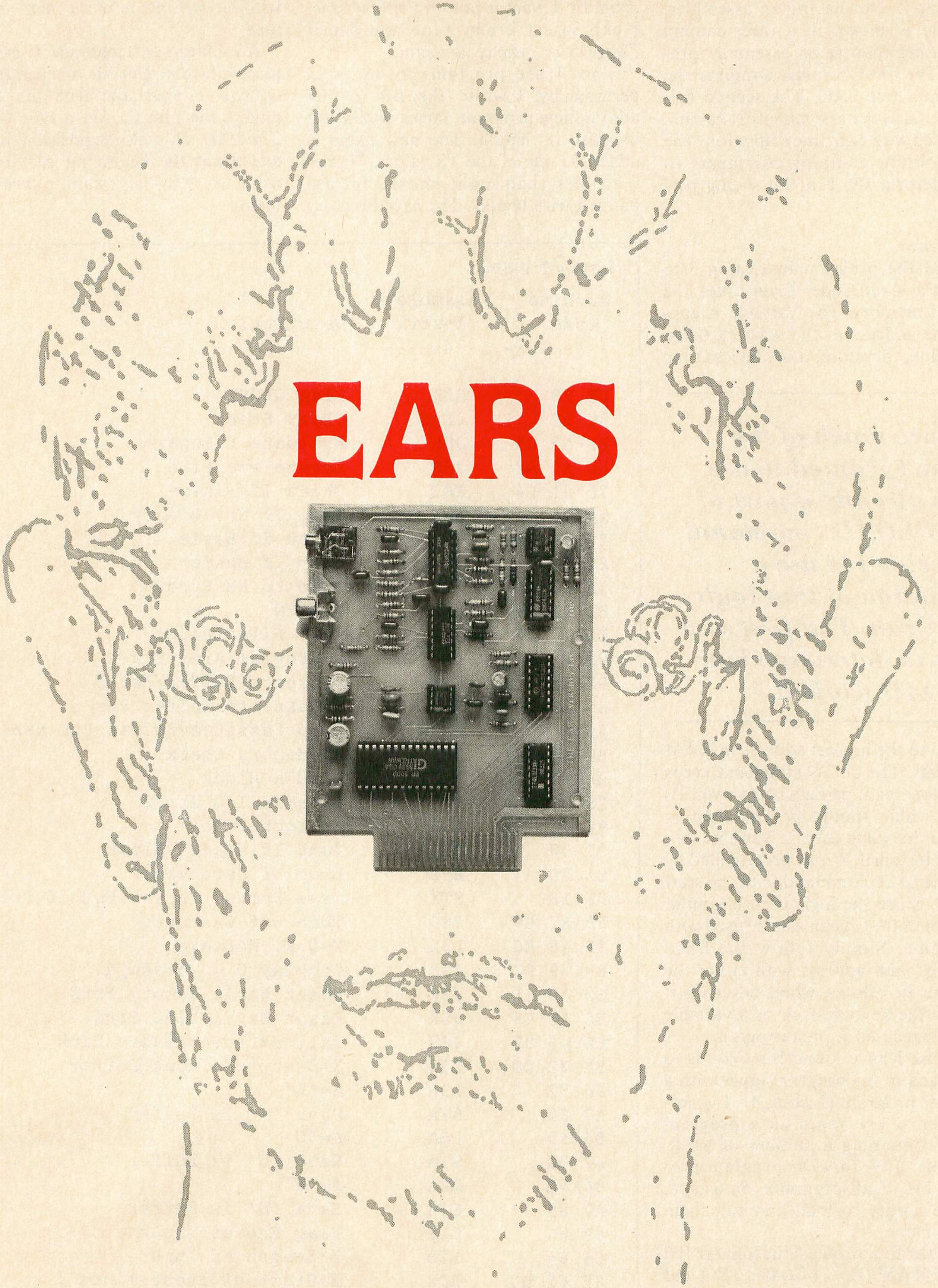

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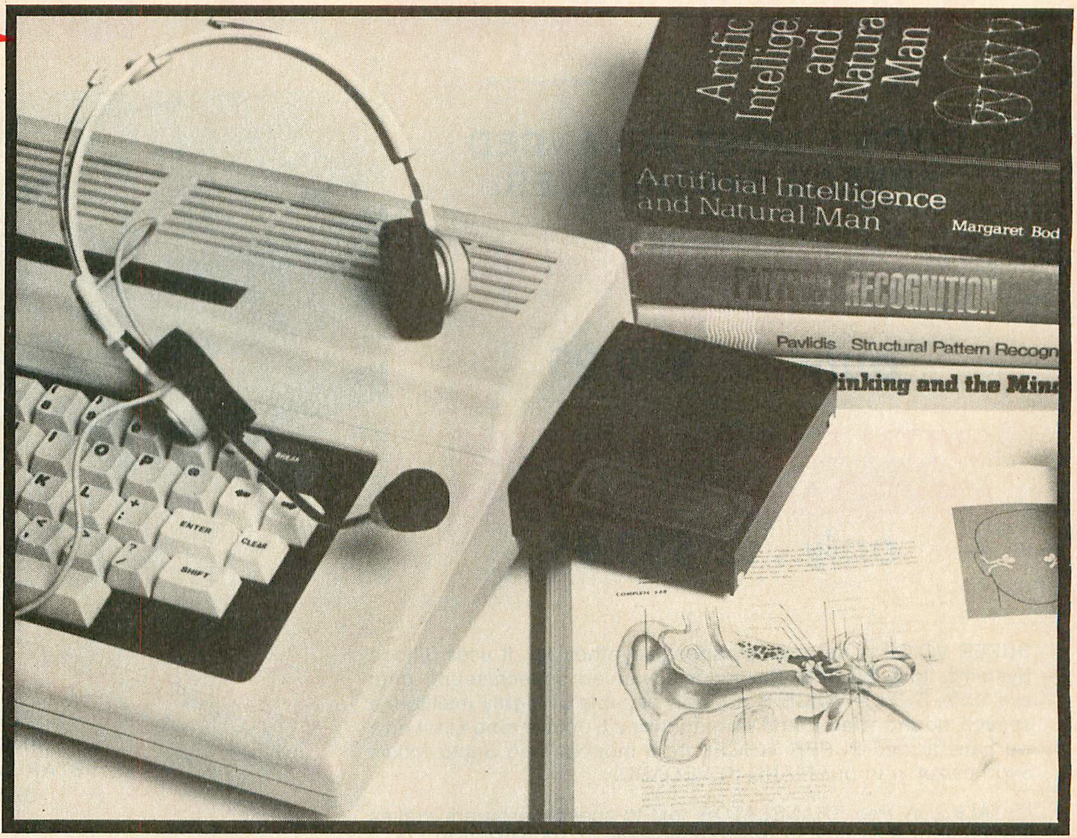
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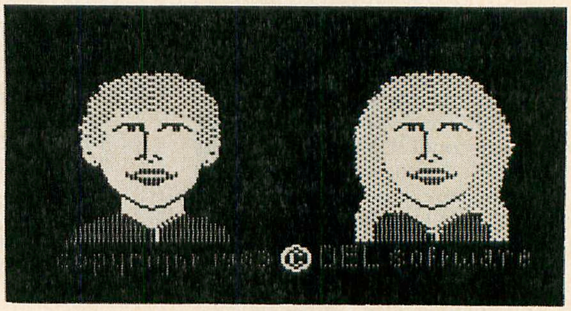

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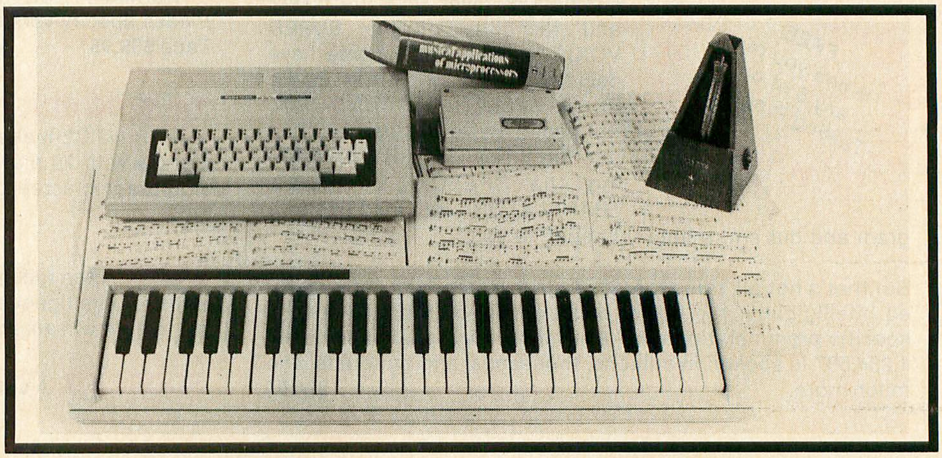

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Y-CABLE or MULTI-PAK. Tape users using both SYMPHONY 12 and the PIANO KEYBOARD will require a Y-CABLE. Disk users will require the Triple Y-Cable or MULTI-PAK.

SYMPHONY 12. You get over a dozen music and sound effect selections and complete documentation. Software is shipped on Tape or Disk.

OPTIONS

MUSIC LIBRARY (each volume)	$29.95
MUSICA 2	$29.95
PIANO KEYBOARD 2½ octave	$79.95
PIANO KEYBOARD 4 octave	$119.95

FREE BLANK DISK OR TAPE WITH EVERY ORDER

VISA® MasterCard

Dealer Inquiries Invited

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Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
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Illinois residents add 6¼% sales tax

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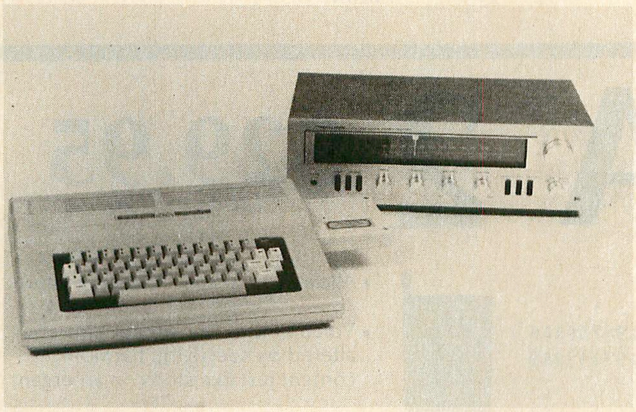
STEREO PAK™

$39.95

Plug this gem into your computer, connect to your home stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY series and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls. Internally we use two high performance 8 bit digital to analog converters to assure fidelity.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY series. Disk users will require our Y-CABLE or a MULTI-PAK.



NEW

COCO MIDI™

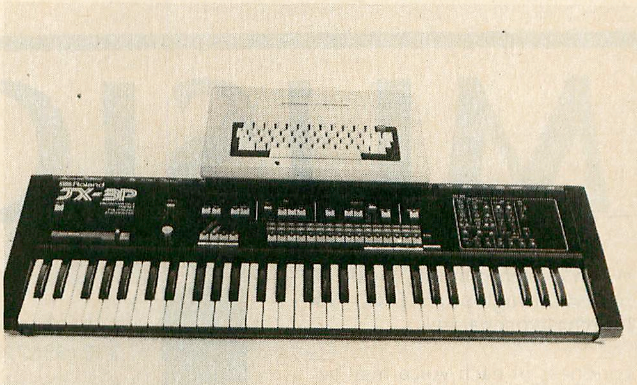
$39.95

Tape or Disk

Now your COCO can talk to your MIDI music synthesizer. Whether you have a Korg, Roland, Casio, or Yamaha, it doesn't matter as long as it's MIDI equipped.

COCO MIDI takes any MUSICA 2 music file and plays it through your music synthesizer. We offer you over 500 tunes from our MUSIC LIBRARY series (sold separately) or create your own music using the best music composition program available, MUSICA 2 (sold separately).

COCO MIDI includes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer.



20 HOURS OF MUSIC

MUSIC LIBRARY™

$29.95

Tape or Disk

The MUSIC LIBRARY series consists of 5 volumes: 100, 200, 300, 400, and 500 each sold separately. Each contains over 100 four voice music selections with a playing time of over 3 hours each. The disk version is shipped on 5 full disks. When coupled with the STEREO PAK, the music is reproduced with unsurpassed realism.

A JUKEBOX program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music. MUSICA 2 users may customize each song. Requires minimum of 32K.

MUSIC LIBRARY 100

Stage, Screen, & TV
Music of the 70's
Music of the 60's
Music of the 50's
Old Time Favorites
Classical
Christmas (popular)
Christmas (traditional)
Patriotic
Polka Party

MUSIC LIBRARY 200 (another 100 selections)
MUSIC LIBRARY 300 (another 100 selections)
MUSIC LIBRARY 400 (another 100 selections)
MUSIC LIBRARY 500 (another 100 selections)

Each volume sold separately, specify tape or disk.

SAVE $50!

Write for complete list.

ALL 500 $99.95

NEW

SYNTHER 77 PLUS

$29.95

Disk

We put the PLUS in SYNTHER 77 PLUS by connecting our PIANO KEYBOARD so you can really play your COCO like a piano.

You control vibrato pattern, Bender rate, Volume level as well as Attack, Decay, Sustain, and Release (ADSR envelope). As you play you can record, then edit and save it to disk or tape. You can even fine tune it to match other instruments.

The PIANO KEYBOARD is not necessary, you can use your COCO keyboard but the PIANO KEYBOARD makes your COCO a real music instrument.

FOR
MUSICA 2
SUPER VOICE
SYMPHONY 12
SYNTHER 77

♫ PIANO KEYBOARD ♫

Now you can really play your Color Computer and pick any or all 4 instruments: **MUSICA 2, SYNTHER 77 PLUS, SUPER VOICE,** and the ultimate **SYMPHONY 12.**

MUSICA 2 users can use the PIANO KEYBOARD as an easy method to input music. Version 2.7 is required. Previous users may obtain an update by returning original tape or disk with $7.00.

SYNTHER 77 PLUS turns your COCO into a music synthesizer without any additional hardware. You specify Vibrato, Bender, Volume, as well as Attack, Decay, Sustain, and Release (ADSR).

SUPER VOICE, COCO's most advanced speech synthesizer becomes a music synthesizer when connected to the PIANO KEYBOARD.

SYMPHONY 12 and the PIANO KEYBOARD gives you a professional 12 voice music synthesizer.

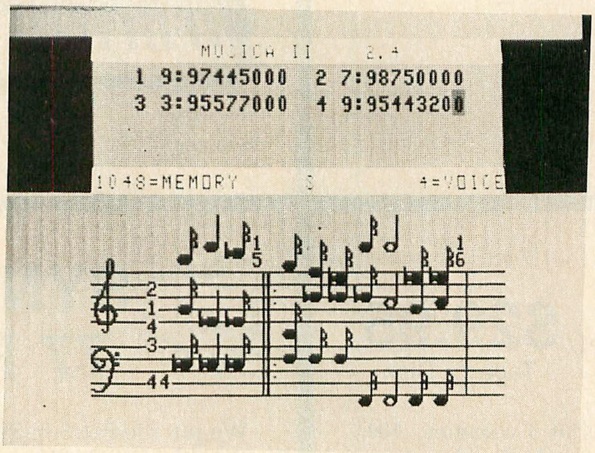
These Piano Keyboards are not toys. They are the same style, shape, size, and feel as professional synthesizer keyboards. Disk owners must use a Y-CABLE or MULTI-PACK.

2½ octave (32 note) . . . . **$79.95** **4 octave** (49 note) **$119.95**

MUSICA 2 $29.95

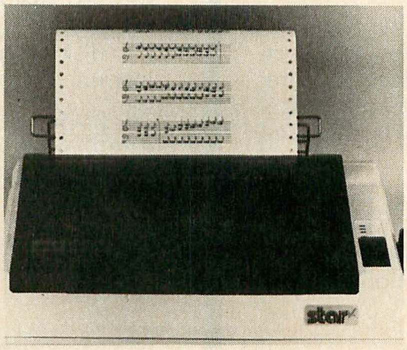
Tape or Disk

- When in stereo mode, music is played through our STEREO PAK (purchased separately).
- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Repeat bars allow repeating of music without re-inserting music a second or third time.
- 30 page manual describes all.
- Requires minimum of **64K**



```
MUSICA II     2.4
1 9:97445000  2 7:98750000
3 3:95577000  4 9:95443200
1048=MEMORY      S      4=VOICE
```

- Output music to your printer (Gemini 10X, Epson, R.S. printers).



- Allows you to specify key signature.
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
- Input notes from Coco keyboard, joystick, or Piano Keyboard.
- Play music from your own BASIC program.
- Block copy music for easy music development.
- 100% machine language so it is lightning fast.
- Vibrato effect easily produced.
- With STEREO PAK, voices may be switched between left and right speakers as music plays.
- Durations include: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, and triplet.

♫ ♫ MUSIC THEORY ♫ ♫

An advanced music course that covers Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and interval ear training. Format of the course includes drill and practice sessions, a scorecard to measure progress, graphics and sound output, and a reviewing session.
32K Disk only **$49.95**

'HOME COMMANDER'

$59.95

VOICE CONTROL
APPLIANCES
WITH EARS

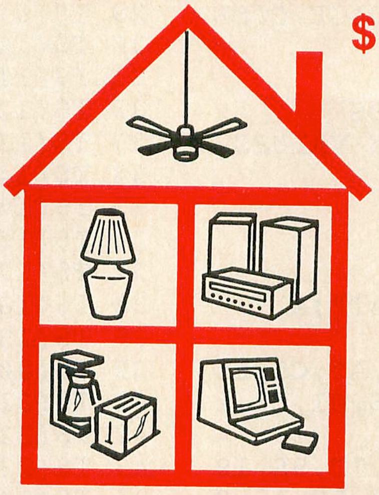
The HOME COMMANDER easily connects to the cassette port of your Color Computer and lets you control appliances in your home.

NO WIRES NECESSARY

The HOME COMMANDER uses your home's existing electrical wiring to control virtually anything. Appliances are controlled via small control modules available at your local SEARS or Radio Shack store.

ON FRIDAY 7:42 PM, OFF SUNDAY 1:26 AM

Included FREE is a program to allow you to control up to 256 devices and specify the time and date they are to be activated. That's right, the software has its own built in accurate clock.



Imagine controlling a light or TV with your voice. When used with our Electronic Audio Recognition System, EARS, you can literally control any appliance.

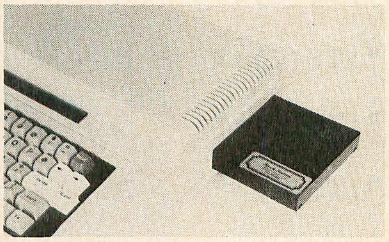
PLUG'N POWER USERS

If you were disappointed in the software that came with the Radio Shack PLUG'N POWER unit, and you probably were, we'll offer you our powerful software separately. An early version is described in the Feb., April, June, and August 1983 issues of RAINBOW. Our current version is even better. **$19.95**

PLUG'N POWER is a trademark of Radio Shack®

PRECISION TIME MODULE $59.95

— INCLUDES OS9 DRIVER —



Now your computer will always know the correct time and date. This amazing precision time module is calibrated to the National Bureau of Standards (WWV) atomic clock and you should never have to change it.

Use the PRECISION TIME MODULE to add the time element to your games or use on BBS. If you like, purchase separately our BBS.

COLORAMA BBS (64 K, 1 drive minimum) **$99.95**

BATTERY BACKUP

Even when your computer is off, the clock keeps correct time by operating using the internal battery backup system.

THE
TIMEPIECE
FOR THE
COLORAMA
BBS

FREE
TALKING CLOCK
PROGRAM
requires VOICE,
SUPER VOICE,
or
SPEECH & SOUND PAK

MONTHS, LEAP YEARS & DST

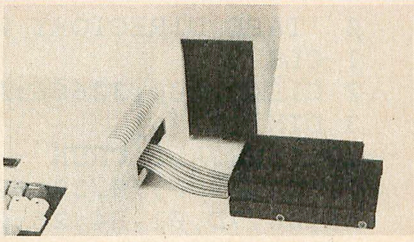
The PRECISON TIME MODULE automatically adjusts for the different number of days in each month as well as leap years. And believe it or not, it adjusts for DST so you don't have to remember if it's SPRING FORWARD or FALL FORWARD.

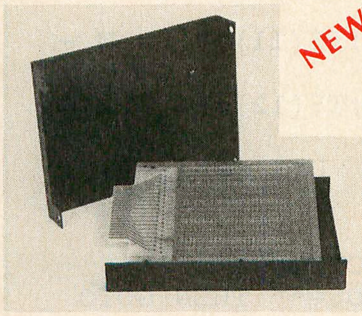
Y-CABLE $28.95

Why pay $100 to $200 for a multi-pak. With the Y-CABLE, you can connect your disk system to your computer along with either our STEREO PAK music synthesizer, our VOICE, SUPER VOICE speech synthesizers, or our PRECISION TIME MODULE. All connectors gold plated.

TRIPLE Y $34.95

We developed the Triple Y-Cable specifically for those interested in both speech synthesis and speech recognition. The Triple Y-Cable lets you connect EARS and SUPER VOICE to your color computer along with your disk system.





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Interested in building your own project? Our oversized board gives plenty of room for construction while the sturdy aluminum case with black satin finish assures protection and a professional appearance.

Prototype Board only **$19.95**
Prototype Enclosure only **$19.95**
Buy both for **$29.95**

Advanced
Speech
Chip
SSI-263
(SC-02)
$34.95

Need an SC-01? **$29.00**

Disks .... (any quantity)	$1.49
Tape C-10, C-20	$0.69
Hard Tape Box	$0.29
6821	$2.95
74LS138	$0.79
7407	$0.79
IC sockets 14, 16, 22 pin	$0.29
IC sockets 24, 28, 40	$0.39

FREE
BLANK DISK
OR TAPE
WITH EVERY
ORDER

VISA® MasterCard

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Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

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1 MEGABYTE COLORAMA **(312) 879-6811 (24 HR. BBS)**

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Listing 3: INSTALL

```
0 'INSTALL MACHINE LANGUAGE CODE
10 CLS
20 CLEAR 200,30000
30 A=30000:'START ADDRESS
40 L=102:'NUMBER OF DATA VALUES
50 FOR X=A TO (A+L)-1
60 READ H$
70 POKE X,VAL("&H"+H$)
80 NEXT X
90 PRINT"CODE INSERTED AT";A
100 END
110 DATA 0F,78,32,62,BD,A5,C5,BD
,A6,48,7D,01,E4,26,05,B6,01,E2,2
7,03,7E,A6,16
120 DATA BD,AD,19,BD,A7,7C,9E,19
,9F,7E,DC,7E,4C,BD,AC,37,BD,A7,0
B,26,34,96,7C,27,30,2A,ED
130 DATA 9F,1B,BD,A7,E9,8E,AB,EC
,BD,B9,9C,BD,AD,21,BD,AC,EF
140 DATA BD,01,82,8E,02,DD,86,52
,A7,80,86,55,A7,80,86,4E,A7,80,6
F,84,C6,04,8E,02,DC,4F,7E,AC,7F
150 DATA BD,AD,19,7E,A6,19
```

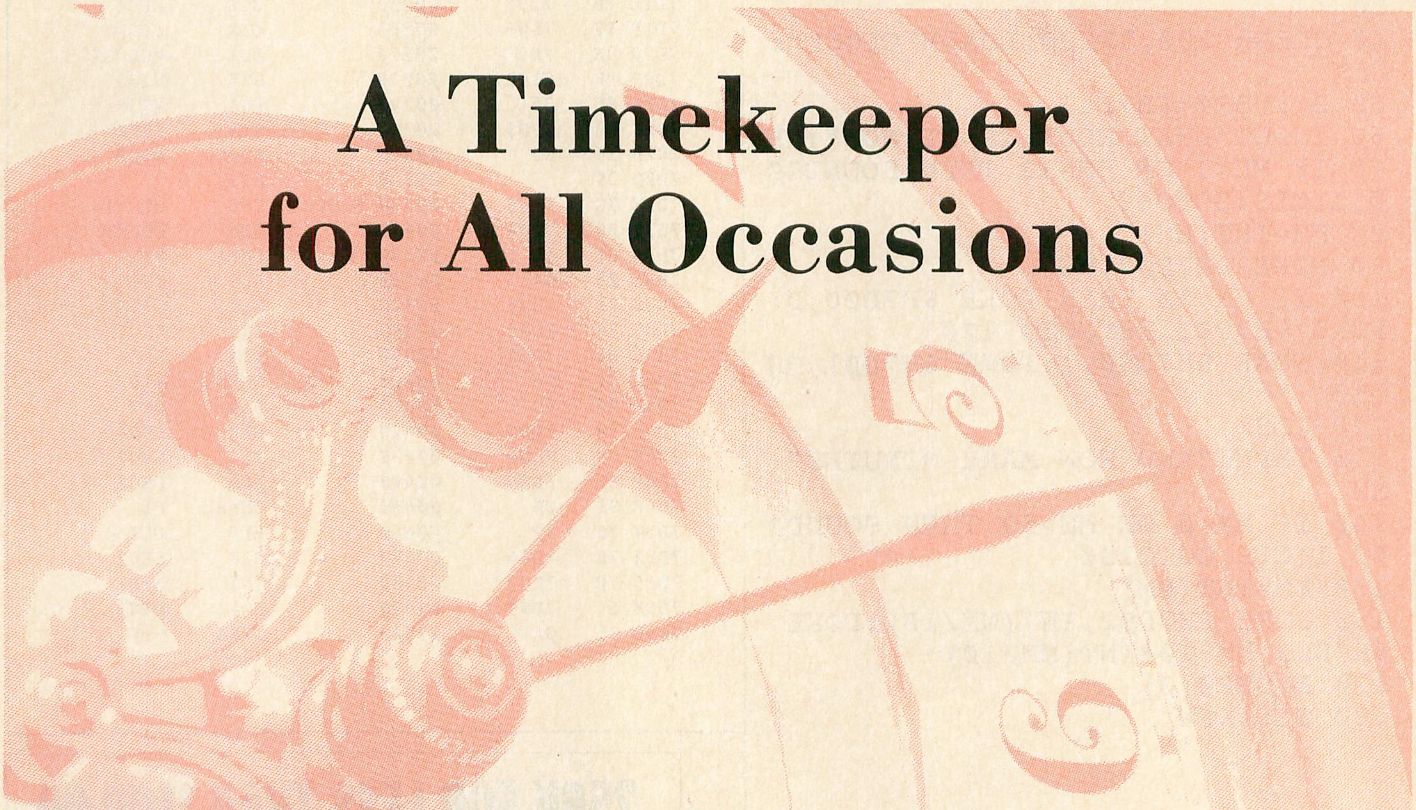
29 228
58 122
END 179

Listing 4: TAPEDIR

```
0 'TAPE DIRECTORY WITH CRUN
1 CLS
2 CLEAR 200,32666:A=32666
3 DIM T$(24)
10 'INSTALL CRUN
11 DATA 0F,78,32,62,BD,A5,C5,BD,
A6,48,7D,01,E4,26,05,B6,01,E2,27
,03,7E,A6,16,BD,AD,19,BD,A7,7C,9
E,19,9F,7E,DC,7E,4C,BD,AC,37,BD,
A7,0B,26,34,96,7C,27,30,2A,ED
12 DATA 9F,1B,BD,A7,E9,8E,AB,EC,
BD,B9,9C,BD,AD,21,BD,AC,EF,BD,01
,82,8E,02,DD,86,52,A7,80,86,55,A
7,80,86,4E,A7,80,6F,84,C6,04,8E,
02,DC,4F,7E,AC,7F
13 DATA BD,AD,19,7E,A6,19
14 FOR P=A TO A+101
15 READ D$:POKE P,VAL("&H"+D$)
16 NEXT P
20 'INITIALIZE DIRECTORY TABLE
21 T$(1)="DIR     "
22 T$(2)="MEMDUMP "
23 T$(3)="INSTALL "
24 T$(4)="CRUN    "
25 T$(5)="        "
26 T$(6)="        "
27 T$(7)="        "
28 T$(8)="        "
29 T$(9)="        "
30 T$(10)="        "
31 T$(11)="        "
32 T$(12)="        "
33 T$(13)="        "
34 T$(14)="        "
35 T$(15)="        "
36 T$(16)="        "
37 T$(17)="        "
38 T$(18)="        "
39 T$(19)="        "
40 T$(20)="        "
41 T$(21)="        "
42 T$(22)="        "
43 T$(23)="        "
44 T$(24)="        "
50 'DISPLAY TAPE DIRECTORY
51 PRINT"         TAPE DIRECTORY
":PRINT
52 PRINT"  A - ";T$(1);"    M -
";T$(13)
53 PRINT"  B - ";T$(2);"    N -
";T$(14)
54 PRINT"  C - ";T$(3);"    O -
";T$(15)
55 PRINT"  D - ";T$(4);"    P -
";T$(16)
56 PRINT"  E - ";T$(5);"    Q -
";T$(17)
57 PRINT"  F - ";T$(6);"    R -
";T$(18)
58 PRINT"  G - ";T$(7);"    S -
";T$(19)
59 PRINT"  H - ";T$(8);"    T -
";T$(20)
60 PRINT"  I - ";T$(9);"    U -
";T$(21)
61 PRINT"  J - ";T$(10);"    V -
 ";T$(22)
62 PRINT"  K - ";T$(11);"    W -
 ";T$(23)
63 PRINT"  L - ";T$(12);"    X -
 ";T$(24)
64 PRINT:PRINT"   USE (shift)(cl
ear) TO EXIT";
65 SCREEN 0,1
70 'PROGRAM SELECTION
71 D$=INKEY$:IF D$="" THEN GOTO
71
72 IF ASC(D$)=92 THEN END
73 IF ASC(D$)<65 OR ASC(D$)>88 T
HEN GOTO 71
74 IF T$(ASC(D$)-64)="        "
THEN SOUND 1,3:GOTO 71
75 SCREEN 0,0:EXEC 32664 T$(ASC(
D$)-64)
```

CLOCK UTILITY

32K
ECB



A Timekeeper for All Occasions

By Marty Ambros

This is a short program that makes your CoCo a timekeeper. Of what use is that, you say? Well, plenty! How about those long typing sessions when the new RAINBOW arrives? It sure is nice to have the time on the screen while hacking away. Not a single precious moment is wasted getting up to see what time it is. And you won't miss those important dates because you lost track of time while developing your new "do-everything" program. Or, if that doesn't whet your appetite, what about the game or utility that has everything . . . except a timing function?

Utility Clock is a machine language subroutine that can be used by itself or with another BASIC or machine language program. It does not interfere with Disk BASIC, but disk I/O slows it down some. Each disk access slows the clock by about a half second; this is negligible.

Using *EDTASM+* or a similar assembler, enter the assembly language code. Assemble it out to disk using the filename *CLOCK/BIN*. Type in the BASIC loader program, but don't run it until it is safely on disk because it erases itself! Now you are ready to use your new clock. Simply type `RUN"CLOCKBAS"` and answer the prompts. Upon answering the last prompt the screen is cleared and the loader program is erased. Immediately, you should see the correct time displayed in the upper right corner of your screen; if not, check for typographical errors. You can write programs and use Disk BASIC as before except now you always have the current time displayed on the screen.

Using the clock from within another BASIC or machine language program is easy. Type `CLEAR200,32000:LOADM "CLOCK"` to put *CLOCK/BIN* in memory. When you want to start timing, just type `EXEC 32008`.

For those who followed the excellent series "Cooking with CoCo," by Colin Stearman, this program is a good candidate for the auto-load feature. Every time you power up, CoCo asks for the time and promptly displays it, while you can work on bigger and better things. □

(Marty Ambros is a student in electrical/computer engineering at the University of Wisconsin in Madison. He enjoys tinkering with CoCo's insides as well as writing useful software. He is designing an interface to connect CoCo to an ECG machine for the University's Cardiology Research Center.)

Listing 1: CLOCKBAS

```
10 'UTILITY CLOCK
20 'BY MARTY AMBROS
30 '
40 CLEAR 200,32000:LOADM"CLOCK":
CLS
50 DEFUSR0=&H7D17
60 INPUT"WHAT HOUR IS IT NOW";HH
70 IF HH<1 OR HH>12 THEN SOUND20
0,1:CLS:GOTO60
80 HH=INT(HH)
90 POKE &H7D07,HH
100 IF HH<10 THEN POKE &H7D00,0:
POKE &H7D01,HH:GOTO 120
110 POKE &H7D00,1:POKE &H7D01,HH
-10
120 CLS
130 INPUT"AND HOW MANY MINUTES";
MM
140 IF MM<0 OR MM>59 THEN SOUND2
00,1:CLS:GOTO130
150 MM=INT(MM)
160 POKE &H7D02,INT(MM/10):POKE
&H7D03,MM-10*INT(MM/10)
170 A=USR0(0)
180 CLS:NEW
```

Listing 2: CLOCK

```
                    00001 *****************************
                    00002 *****************************
                    00010 *UTILITY CLOCK              *
                    00020 *BY MARTY AMBROS            *
                    00021 *****************************
                    00022 *****************************
                    00030
7D00                00100          ORG       32000
7D00                00110 HOUR2    RMB       1
7D01                00120 HOUR1    RMB       1
7D02                00130 MIN2     RMB       1
7D03                00140 MIN1     RMB       1
7D04                00150 SEC2     RMB       1
7D05                00160 SEC1     RMB       1
7D06                00170 COUNT    RMB       1
7D07                00180 HOUR     RMB       1
                    00181
                    00185 *"EXEC" STARTING POINT
                    00186 *CLOCK IS STARTED AT TIME
                    00187 *EQUAL TO 00:00:00
                    00188
7D08 7F   7D00      00190 START1   CLR       HOUR2
7D0B 7F   7D01      00200          CLR       HOUR1
7D0E 7F   7D02      00210          CLR       MIN2
7D11 7F   7D03      00220          CLR       MIN1
7D14 7F   7D07      00230          CLR       HOUR
                    00231
                    00232 *BASIC LOADER PROGRAM
                    00233 *STARTING POINT. TIME
                    00234 *SHOULD BE INITIALIZED
                    00235 *PRIOR TO BRANCHING
                    00236 *HERE
                    00237
7D17 7F   7D04      00240 START2   CLR       SEC2
7D1A 7F   7D05      00250          CLR       SEC1
7D1D 7F   7D06      00260          CLR       COUNT
7D20 8E   7D2E      00270          LDX       #CLOCK
7D23 BF   010D      00280          STX       $010D
7D26 86   35        00290          LDA       #$35
7D28 B7   FF03      00300          STA       $FF03
7D2B 1C   EF        00310          ANDCC     #$EF
7D2D 39             00320          RTS
7D2E 7C   7D06      00330 CLOCK    INC       COUNT
7D31 B6   7D06      00340          LDA       COUNT
7D34 81   3B        00350          CMPA      #59
7D36 25   6A        00360          BLO       OUT
7D38 7F   7D06      00370          CLR       COUNT
7D3B 7C   7D05      00380          INC       SEC1
7D3E B6   7D05      00390          LDA       SEC1
7D41 81   0A        00400          CMPA      #10
7D43 25   5D        00410          BLO       OUT
7D45 7F   7D05      00420          CLR       SEC1
7D48 7C   7D04      00430          INC       SEC2
7D4B B6   7D04      00440          LDA       SEC2
7D4E 81   06        00450          CMPA      #6
7D50 25   50        00460          BLO       OUT
7D52 7F   7D04      00470          CLR       SEC2
7D55 7C   7D03      00480          INC       MIN1
7D58 B6   7D03      00490          LDA       MIN1
7D5B 81   0A        00500          CMPA      #10
```

256K FOR LESS THAN $100.00

EASY SOLDERLESS INSTALLATION
INCLUDES 35/40 TRACK RAM DISK
(Compatible with RSDOS, JDOS and ADOS)

RAM DISK requires DISK BASIC

134 GRAPHICS PAGES IN EC BASIC

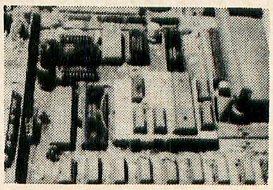
THE 256K RAM "BANKER"

J&R proudly announces the "BANKER," a 256K internal board for COCO I or COCO II that can be upgraded to 32K/64K with the addition of 4164 type (8 each) memory chips, socketed SAM and memory chips. SAM and memory chips must be socketed for solderless installation. The 26-3136 Korean version COCO II and COCO II with suffix A or B MAY require an adapter, call or write for information. The "BANKER" installs in the SAM (6883/74LS783) socket. The "BANKER" works with COLOR BASIC, EXTENDED BASIC, and DISK EXTENDED BASIC (JDOS and ADOS), Cassette or Disk systems.

The "BANKER" was designed to be compatible with ALL hardware and absolutely compatible with any 64K software or hardware addressing.

Featured in Sept. '85
HOT COCO

40TRK SINGLE SWAP
MULTIPLE COPY
DISK BACKUP
PCOPY 134
BANKRPAG
35/40 TRK RAM DISK



256K
MEMORY TEST

RAM DISK WITH
TELEWRITER-64

32K TO 192K
PRINT SPOOLER

OS9BTFIX

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```
7D5D 25    43      00510         BLO     OUT
7D5F 7F    7D03    00520         CLR     MIN1
7D62 7C    7D02    00530         INC     MIN2
7D65 B6    7D02    00540         LDA     MIN2
7D68 81    06      00550         CMPA    #6
7D6A 25    36      00560         BLO     OUT
7D6C 7F    7D02    00570         CLR     MIN2
7D6F 7C    7D07    00580         INC     HOUR
7D72 B6    7D07    00590         LDA     HOUR
7D75 81    0D      00600         CMPA    #13
7D77 25    11      00610         BLO     SKIP1
7D79 7F    7D07    00620         CLR     HOUR
7D7C 7C    7D07    00630         INC     HOUR
7D7F 7F    7D01    00640         CLR     HOUR1
7D82 7C    7D01    00650         INC     HOUR1
7D85 7F    7D00    00660         CLR     HOUR2
7D88 20    18      00670         BRA     OUT
7D8A 81    0A      00680 SKIP1   CMPA    #10
7D8C 25    11      00690         BLO     SKIP3
7D8E 26    03      00700         BNE     SKIP2
7D90 7F    7D01    00710         CLR     HOUR1
7D93 80    0A      00720 SKIP2   SUBA    #10
7D95 B7    7D01    00730         STA     HOUR1
7D98 86    01      00740         LDA     #1
7D9A B7    7D00    00750         STA     HOUR2
7D9D 20    03      00760         BRA     OUT
7D9F B7    7D01    00770 SKIP3   STA     HOUR1
7DA2 8E    0418    00780 OUT     LDX     #$418
7DA5 B6    7D00    00790         LDA     HOUR2
7DA8 8B    70      00800         ADDA    #112
7DAA A7    80      00810         STA     ,X+
7DAC B6    7D01    00820         LDA     HOUR1
7DAF 8B    70      00830         ADDA    #112
7DB1 A7    80      00840         STA     ,X+
7DE4 4A            01060         DECA
7DE5 B7    0985    01070         STA     $985
```

```
7DE8 26    0B      01080         BNE     SKIP4
7DEA B6    0986    01090         LDA     $986
7DED 84    B0      01100         ANDA    #$B0
7DEF B7    0986    01110         STA     $986
7DF2 B7    FF40    01120         STA     $FF40
7DF5 7E    8955    01130 SKIP4   JMP     $8955
7DF8 3B            01140 SKIP5   RTI
           7D08    01150         END     START1
00000 TOTAL ERRORS
7DB3 86    7A      00850         LDA     #122
7DB5 A7    80      00860         STA     ,X+
7DB7 B6    7D02    00870         LDA     MIN2
7DBA 8B    70      00880         ADDA    #112
7DBC A7    80      00890         STA     ,X+
7DBE B6    7D03    00900         LDA     MIN1
7DC1 8B    70      00910         ADDA    #112
7DC3 A7    80      00920         STA     ,X+
7DC5 86    7A      00930         LDA     #122
7DC7 A7    80      00940         STA     ,X+
7DC9 B6    7D04    00950         LDA     SEC2
7DCC 8B    70      00960         ADDA    #112
7DCE A7    80      00970         STA     ,X+
7DD0 B6    7D05    00980         LDA     SEC1
7DD3 8B    70      00990         ADDA    #112
7DD5 A7    84      01000         STA     ,X
                   01001
                   01002 *DISK DRIVE ALSO USES THE
                   01003 *INTERUPT SO LET'S TAKE
                   01004 *CARE OF ITS NEEDS...
                   01005
7DD7 B6    FF03    01010 DISK    LDA     $FF03
7DDA 2A    1C      01020         BPL     SKIP5
7DDC B6    FF02    01030         LDA     $FF02
7DDF B6    0985    01040         LDA     $985
7DE2 27    11      01050         BEQ     SKIP4
```

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GAME

". . . a gentle but tricky arcade game that involves nothing more violent than a hummingbird popping bubbles"

Bubble Wars!

By Richard Ramella

"**Ping!**" said the kid. "Captain Nick Hazard is sailing through deep space in his Blue Death Suit. He sends another dread Rotundo to its maker!"

"That's not Captain Nick Hazard," I told the kid. "It's a hummingbird. And the orange things are just bubbles, not some kind of space creatures."

"They're the most-feared space creatures of all! They want to turn Captain Nick inside out!"

"Will you stop it?" I asked. "This is a non-violent arcade game for CoCo computers with at least 16K memory, Extended Color BASIC and one joystick."

"This is the most violent game I've ever played!" yelled the kid. "Ping! Pow! Bar-room! Yucko, look at 'em splatter!"

I withdrew. The kid playing the game *Bubble War* was and still is my son. He's 10. At age 3 he wanted a toy gun. When my wife and I refused, he chewed a graham cracker into the shape of a pistol and genially "powed" anyone who came near his high chair.

Not much has changed in the last eight years.

Despite its name, *Bubble War* is a gentle but tricky arcade game that involves nothing more violent than a blue hummingbird popping orange bubbles. It demonstrates how to have fun without destroying the universe.

If your computer won't accept the speed `POKE 65495,0`, delete Line 130.

At the start of the game, a white screen bordered by green appears. Within it is a wing-flapping blue hummingbird. Using the joystick, you can move the bird around the screen at a fair clip. It goes either northeast, southeast, southwest or northwest, depending on the quadrant in which the joystick is being held. Push the firebutton on the joystick and the hummingbird fires in the general direction it's traveling — left if moving westward, right if eastward.

Aim and fire to burst bubbles. Hits are scored according to the current size of orange bubbles appearing on the screen. Avoid taking the hummingbird

---

(Richard Ramella is a former newspaper editor who now works as a writer for a California hospital. He has published more than 200 Color Computer programs.)

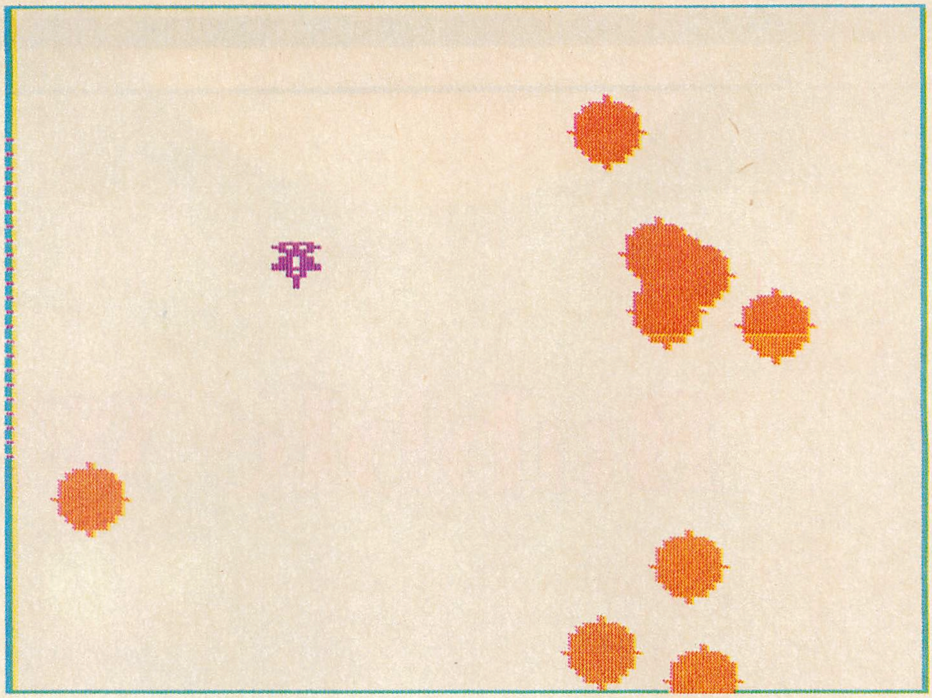
too near any orange bubble or debris thereof; this will end the game.

From time to time, the action freezes and a colorful series of concentric circles spreads over the screen. The screen blanks and play resumes. This is done to wipe out bubble debris.

To see a current score during the game, press keyboard letter 'X', then press any other key except SHIFT or BREAK to continue play.

My son persists in imagining danger and triumph in his games. Sometimes I try to tell him that all computer arcade games are comprised in totality of but one fundamental idea. There are teams of light, whether two pixels or a thousand complex graphics shapes. One team chases, the other evades. As the player you may be on either side. The mind fills in the rest of the fantasy.

(You may contact the author with any questions about *Bubble Wars* by writing to 1493 Mt. View Avenue, Chico, CA 95926, phone 916-343-7658. Please enclose an SASE for a reply.) ☐



330 243
560 95
810 92
END 86

The listing: BUBBLWAR

```
100 REM * BUBBLE WAR * TRS-80 EX
TENDED COLOR BASIC 16K *
110 REM * BY RICHARD RAMELLA *
120 REM * REQUIRES ONE JOYSTICK
*
130 POKE 65495,0
140 CLEAR 256
150 PL$="L255;GFEDCBA"
160 DIM M1(1,6),M2(1,6)
170 CLS
180 HG=10
190 PG=10
200 PRINT @ 235,"BUBBLE WAR"
210 PMODE 3,1
220 PCLS 1
230 COLOR 3,5
240 P=128
250 Q=96
260 FOR G=1 TO 2
270 CIRCLE(10,10),5,3,1.5
280 CIRCLE(10,5),7,3,.3
290 LINE(4,11)-(17,11),PSET
300 IF G=1 THEN LINE -(10,15),PS
ET ELSE LINE -(10,5),PSET
310 LINE -(4,11),PSET
320 IF G=1 THEN GET(0,0)-(20,20)
,M1,G ELSE GET(0,0)-(20,20),M2,G
330 PCLS 1
340 NEXT G
350 SCREEN 1,1
360 CIRCLE(128,96),255,6
370 U=119
380 R=86
390 IF U<5 THEN U=5 ELSE IF U>22
9 THEN U=229
400 IF R<1 THEN R=1 ELSE IF R>17
0 THEN R=170
410 CT=CT+1: IF CT>150 THEN GOSU
B 1080: CT=0
420 PUT(U,R)-(U+20,R+20),M1,PSET
430 PSET(X,R-1,3)
440 IF PPOINT(U-1,R-1)=8 OR PPOI
NT(U+10,R-1)=8 OR PPOINT(U+21,R-
1)=8 OR PPOINT(U-1,R+10)=8 OR PP
OINT(U+21,R+10)=8 OR PPOINT(U-1,
R+21)=8 OR PPOINT(U+10,R+21)=8 O
R PPOINT(U+21,R+21)=8 THEN 870
450 S=RND(PG)
460 IF S=1 THEN GOSUB 620
470 K=JOYSTK(0)
```

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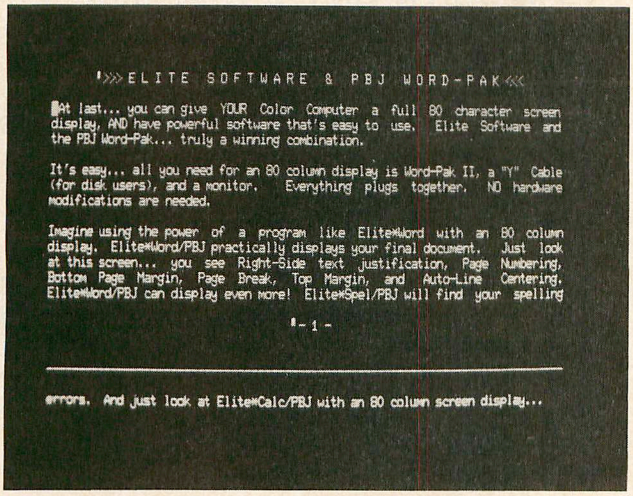

```
*>>> E L I T E   S O F T W A R E   &   P B J   W O R D - P A K <<<

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                                  *- 1 -

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```

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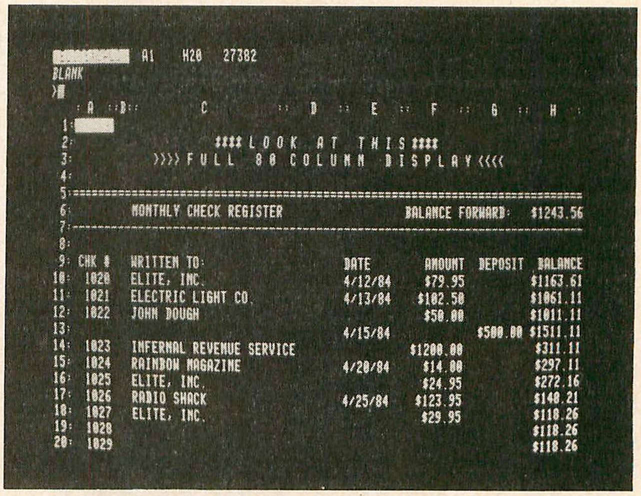

```
            A1    H20   27382
BLANK
>
  : A ::B::          C          ::   D   ::   E   ::   F   ::   G   ::   H   :
 1:
 2:                  $$$$ L O O K   A T   T H I S $$$$
 3:           >>>> F U L L   8 0   C O L U M N   D I S P L A Y <<<<
 4:
 5:============================================================================
 6:         MONTHLY CHECK REGISTER                     BALANCE FORWARD:  $1243.56
 7:----------------------------------------------------------------------------
 8:
 9: CHK #   WRITTEN TO:                     DATE        AMOUNT  DEPOSIT  BALANCE
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11:  1021   ELECTRIC LIGHT CO.             4/13/84     $102.50           $1061.11
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19:  1028                                                                 $118.26
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```
480 L=JOYSTK(1)
490 PUT(U,R)-(U+20,R+20),M2,PSET
500 IF K>31 THEN U=U+4
510 IF K<31 THEN U=U-4
520 IF L>31 THEN R=R+4
530 IF L<31 THEN R=R-4
540 PK=PEEK(65280)
550 IF PK=126 OR PK=254 THEN GOS
UB 590
560 XG$=INKEY$
570 IF XG$="X" THEN GOSUB 980
580 GOTO 390
590 IF K>31 THEN GOSUB 710
600 IF K<31 THEN GOSUB 790
610 RETURN
620 G=RND(255)
630 P=RND(191)
640 IF G>U-21 AND G<U+42 AND P>R
-21 AND P<R+42 THEN 700
650 CIRCLE(G,P),HG,8
660 PAINT(G,P),8
670 NN=NN+1
680 IF NN=10 THEN HG=HG+5: NN=0:
 JK=JK+1: IF JK=2 THEN PG=PG-1
690 IF PG<1 THEN PG=1
700 RETURN
710 M=U+22
720 N=R+9
730 IF M>253 THEN RETURN ELSE PS
ET(M,N,3)
740 S=RND(PG+20)
750 IF S=1 THEN GOSUB 620
760 V=PPOINT(M+2,N)
770 IF V<>5 AND V<>7 THEN 930 EL
SE PRESET(M,N): M=M+5: GOTO 730
780 RETURN
790 M=U-1
800 N=R+10
810 IF M<2 THEN RETURN ELSE PSET
(M,N,3)
820 S=RND(PG+20)
830 IF S=1 THEN GOSUB 620
840 V=PPOINT(M-2,N)
850 IF V<>5 AND V<>7 THEN 930 EL
SE PRESET(M,N): M=M-5: GOTO 810
860 RETURN
870 FOR T=1 TO 15
880 PUT(U,R)-(U+20,R+20),M1,NOT
890 PLAY PL$
900 NEXT T
910 XX=1
920 GOTO 980
930 IF V=6 THEN 950
940 IF V=8 THEN CIRCLE(M,N),25,5
: PAINT(M,N),5,5: PLAY PL$: SC=S
C+(HG*10)
950 IF V=6 THEN PRESET(M,N)
960 CIRCLE(128,96),255,6
970 RETURN
980 IF XX=1 THEN POKE 65494,0: P
RINT @ 331,"F I N A L";
990 PRINT @ 235,"BUBBLE WAR";
1000 PRINT @ 363,"S C O R E";
1010 PRINT @ 394,SC;
1020 IF XX=1 THEN YU=YU+1: PLAY
PL$
1030 IF XX=1 AND YU<40 THEN 1020
 ELSE IF YU=40 THEN END
1040 PRINT @ 448,"TAP A KEY TO R
ETURN TO GAME";
1050 XX$=INKEY$
1060 IF XX$<>"" THEN CLS: SCREEN
 1,1: RETURN ELSE 1050
1070 END
1080 FOR BN=0 TO 150 STEP 3
1090 CIRCLE(129,96),BN,1+RND(3),
1
1100 IF BN<20 THEN PLAY "T128;CD
EFGAB"
1110 NEXT BN
1120 PCLS1
1130 CIRCLE(128,96),255,6
1140 RETURN
1150 END
1160 REM * END OF LISTING
```

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RAM TEST

16K

". . . a confidence check for the RAM-SAM portion of your Color Computer."

What's the Diagnosis?

By Craig V. Bobbitt

An assembly language memory checker for the Color Computer, *Memory Diagnostic* has two modes:

1) Short — Every byte is tested to see that each of its bits can be cleared and set (compared to correct values in Register A), then the bytes adjacent to the target byte, which contain the complement of the target, are tested to make sure they don't follow the target (a common memory chip problem).

2) Long — All bit combinations are written into each memory location and checked against Register A.

The program is relocatable and jumps over itself during execution. It is heavily commented and should be fairly easy to follow. It has only been tested on a 64K machine, but it should work in any system configuration of the CoCo.

Lines 45-75	display the title and request memory size.
Lines 78-84	move BASIC to RAM if 64K is selected.
Lines 86-95	request long or short diagnostic.
Lines 96-157	are the body of the short option.
Lines 159-177	are the body of the long option.
Lines 179-END	display error messages.

The listing details how to force an error to see how that part of the program works. *Memory Diagnostic* is intended as a confidence check for the RAM-SAM portion of the Color Computer.

(If you have any questions regarding this program you may contact the author at P.O. Box 584, Greenville, TX 75401, phone 214-457-4476. Please include an SASE when writing.) ☐

(Craig Bobbitt lives in Greenville, Texas, and works on computer and peripheral hardware as a test engineer.)

The listing: MEMDIAG

```
0001        NAM   MEMDIAG 2.2
0002        OPT   NOG
0003 *MEMORY DIAGNOSTIC FOR 64K TRS80 COLOR COMPUTER
0004 *20 APRIL 84
0005 *(C) BY CRAIG V. BOBBITT
0006 *P.O BOX 584
0007 *GREENVILLE,TX 75401
0008 ************************************************
0009 *                                              *
0010 *   THIS PROGRAM RUNS A MEMORY TEST ON ALL     *
0011 *   LOCATIONS IN THE COLOR COMPUTER FROM       *
0012 *   0000 TO END OF MEMORY.  ANY DATA           *
0013 *   ERRORS ARE REPORTED TO                     *
0014 *   THE SCREEN AND THE OPERATOR HAS THE OPTION *
0015 *   OF ENDING THE TEST OR CONTINUING WITH      *
0016 *   THE NEXT LOCATION.                         *
0017 *   THE SHORT TEST PUTS A PATTERN OF ALL ONES  *
0018 *   AND ALL ZEROS IN EACH LOCATION COMPARING   *
```

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In an age long past, a dwarven race lived in their mountain home. They were forced to flee under threat of destruction leaving behind their most powerful possession, the Earthstone. As a prominent adventurer, you will be asked to undertake a perilous quest, the recovery of the Earthstone! This is your FIRST adventure in the search for what is deemed to have been the cornerstone of the legendary power of the dwarves.

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If you have been waiting for a game for your color computer that has everything, your wait is over. **WARP FACTOR X** is here. This all graphics simulation game requires strategy, fast thinking, an eye for detail, and above all experience in knowing the capabilities of your starship and its computer. You will begin your adventure into space as a cadet but your ultimate goal is to become Captain of the Enterprise. To do this you must neutralize the enemy planets and eliminate the Klingon starbases along with the Klingons themselves.The Klingon is not a "Robot." He has the same capabilities as your starship but he is also subject to the same problems. You will find that he is inclined to move around while you are attacking him and may even chase you when you find it prudent to retreat. You must form alliances with neutral planets and bring them into the federation. Many of the planets will have special resources which will help the federation.

WARP FACTOR X was written by an engineer for the Kennedy Space Center and has been three years in the making. You will appreciate the attention to detail and complex inner workings of the program. The program is supported by eight pages of documentation important to the success of your mission. Your progress through the eighteen sectors of the galaxy will be recorded and saved for your next adventure into space. **WARP FACTOR X** includes versions for 32K, 64K, and COCO 2. It requires one disk drive and comes packaged in a vinyl library case. **$34.95**

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FAMILY-TREE

FAMILY-TREE is a sophiticated program that can help organize your families' history. Whether you are new to genealogy or an experienced genealogist you will find **FAMILY-TREE** of great assistance. It is specifically designed to organize family relationships and supply information on each person. Information can be listed on the screen or printer even a pedigree chart listing up to 4 generations. Records can be altered or deleted and additions made quickly and easily. Each file can contain over 160 names and, of course, you can have files for every branch of the family. Smaller files can be combined. There is even a help file on the disk version. Requires 64K. **TAPE — $24.95; DISK — $29.95**

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```
                *   IT VERIFIES BOTH OF THOSE VALUES.  THE       *
                *   ADJACENT BYTES CONTAIN COMPLEMENTED DATA     *
                *   AND THEY ARE CHECKED TO INSURE THEY DON'T    *
                *   FOLLOW THE TARGET BYTE.                      *
                *   THE LONG TEST WRITES ALL COMBINATIONS IN     *
                * EACH  BYTE OF MEMORY VERIFYING THAT THEY ARE   *
                *   READ BACK CORRECTLY.  EXECUTION TIME FOR     *
                *   THE SHORT TEST IS ABOUT 12 SECONDS, THE      *
                *   LONG TEST TAKES ABOUT 6 MINUTES              *
                *   ALL LOCATIONS ARE RESTORED TO THEIR          *
                *   ORIGINAL VALUES                              *
                *   THE PROGRAM JUMPS AROUND ITSELF.             *
                *   TO FORCE AN ERROR, LOAD PROGRAM AT $3000     *
                *   (DEFAULT) AND EXEC &H3066 SELECT SHORT OPT   *
                *                                                *
                **************************************************



                *PROGRAM IS RELOCATABLE
3000                   ORG    $3000
A1C1            GETCHR EQU    $A1C1        KEYBOARD INPUT
A002            CHROUT EQU    $A002        SCREEN OUTPUT

3000 1A50       START  ORCC   #$50         TURN OFF INTERRUPTS

3002 BDA928     .MSIZE JSR    $A928        CLEAR SCREEN
3005 318D0203          LEAY   MSG1,PCR     FIND THE MESSAGE
3009 170141            LBSR   DISPLA       WRITE IT
300C BDA1C1     GETSIZ JSR    GETCHR       LOOK FOR A CHARACTER
300F 27FB              BEQ    GETSIZ       WAIT FOR KEYPRESS
3011 8131              CMPA   #'1          /16K/
3013 2710              BEQ    .16K
3015 8132              CMPA   #'2          /32K/
3017 271C              BEQ    .32K
3019 8133              CMPA   #'3          /64K/
301B 2728              BEQ    .64K
301D 8134              CMPA   #'4          /ABORT/
301F 102702B5          LBEQ   DONE
3023 20E7              BRA    GETSIZE      ILLEGAL OPTION

3025 8E3FFF     .16K   LDX    #$3FFF       TOP OF RAM FOR 16K
3028 AF8D02C5          STX    MEMEND,PCR   SAVE IT
302C 8E3136            LDX    #"16
302F AF8D0136          STX    HEADER+23,PCR PUT 16 IN OUTPUT STRING
3033 2031              BRA    WRTHDR       CONTINUE

3035 8E7FFF     .32K   LDX    #$7FFF       TOP OF RAM FOR 32K
3038 AF8D02B5          STX    MEMEND,PCR   SAVE IT
303C 8E3332            LDX    #"32
303F AF8D0126          STX    HEADER+23,PCR
3043 2021              BRA    WRTHDR

3045 8EFEFF     .64K   LDX    #$FEFF       TOP OF RAM FOR 64K
3048 AF8D02A5          STX    MEMEND,PCR   SAVE IT
304C 8E3634            LDX    #"64
304F AF8D0116          STX    HEADER+23,PCR

                *GO TO 64K MODE
3053 8E8000            LDX    #$8000       START OF ROM
3056 B7FFDE     MOVE   STA    $FFDE        SWITCH PAGE
3059 A680              LDA    ,X+          GET BYTE FROM ROM
305B B7FFDF            STA    $FFDF        SWITCH PAGE BACK
305E A71F              STA    -1,X         STORE IN RAM
3060 AC8D028D          CMPX   MEMEND,PCR   END OF ROM
3064 25F0              BLO    MOVE

```

```
3066 BDA928        0086 WRTHDR JSR    $A928        CLEAR SCREEN
3069 318D00E5      0087        LEAY   HEADER,PCR   GET ADX OF HEADER
306D 1700DD        0088        LBSR   DISPLA       WRITE IT
3070 BDA1C1        0089 INPUT  JSR    GETCHR       GO GET A CHARACTER
3073 27FB          0090        BEQ    INPUT        WAIT FOR IT
3075 AD9FA002      0091        JSR    [CHROUT]     ECHO CHARACTER
3079 814C          0092        CMPA   #'L          LONG DIAGNOSTIC?
307B 1027009E      0093        LBEQ   LONG         YES
307F 8153          0094        CMPA   #'S          SHORT?
3081 26E3          0095        BNE    WRTHDR       BAD INPUT RETURN
3083 8EFFFF        0096        LDX    #$FFFF       FIRST LOCATION -1
3086 318DFF76      0097        LEAY   START,PCR
308A 10AF8D0260    0098        STY    TEMP,PCR     SAVE START OF PROGRAM
308F 3001          0099 SLOOP  LEAX   1,X
3091 E684          0100        LDB    ,X           SAVE THE BYTE
3093 E78D025D      0101        STB    TARGET,PCR
3097 E61F          0102        LDB    -1,X         GET LOWER ADJACENT BYTE
3099 E78D0258      0103        STB    LOWER,PCR    STORE IT AWAY
309D E601          0104        LDB    1,X          GET UPPER ADJACENT BYTE
309F E78D0250      0105        STB    UPPER,PCR    STORE IT
30A3 C6FF          0106        LDB    #$FF         COMPLEMENT OF TARGET BYTE
30A5 E71F          0107        STB    -1,X         SET ADJ BYTES TO COMPLEMENT
30A7 E701          0108        STB    1,X
30A9 6F84          0109        CLR    ,X           CLEAR CURRENT LOCATION
30AB 4F            0110        CLRA                ZERO TO START
30AC A184          0111        CMPA   ,X           ARE THEY EQUAL??
30AE 2703          0112        BEQ    SCONT        YES GO AHEAD
30B0 1701BB        0113        LBSR   ERROR        ERROR IF NOT EQUAL
                   0114 *  DON'T DO ADJACENT BYTES IF AT START
                   0115 *  OR END OF MEMORY
30B3 8C0000        0116 SCONT  CMPX   #0           START OF MEMORY?
30B6 2714          0117        BEQ    SCONT2       YES DON'T DO ADJ BYTES
```

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```
30B8 AC8D0235   0118         CMPX  MEMEND,PCR   END?
30BC 270E       0119         BEQ   SCONT2       YES DON'T CHECK ADJ BYTES
                0120 *HAVE ADJACENT BYTES CHANGED?
30BE E101       0121         CMPB  1,X          UPPER ADJACENT
30C0 2703       0122         BEQ   SCONT1
30C2 1701A9     0123         LBSR  ERROR        REPORT ERROR
30C5 E11F       0124 SCONT1  CMPB  -1,X         LOWER ADJACENT
30C7 2703       0125         BEQ   SCONT2
30C9 1701A2     0126         LBSR  ERROR
30CC 43         0127 SCONT2  COMA               COMPLEMENT THE GOOD VALUE
30CD 53         0128         COMB               COMPLEMENT ADJ BYTES
30CE 6301       0129         COM   1,X
30D0 631F       0130         COM   -1,X
30D2 6384       0131         COM   ,X
30D4 A184       0132         CMPA  ,X           ALL BITS SET??
30D6 2703       0133         BEQ   SCONT3       YES GO AHEAD
30D8 170193     0134         LBSR  ERROR
30DB 8C0000     0135 SCONT3  CMPX  #0           FIRST LOCATION?
30DE 2714       0136         BEQ   SCONT5
30E0 AC8D020D   0137         CMPX  MEMEND,PCR
30E4 270E       0138         BEQ   SCONT5
30E6 E11F       0139         CMPB  -1,X         B SHOULD = ADJ BYTES
30E8 2703       0140         BEQ   SCONT4
30EA 170181     0141         LBSR  ERROR
30ED E101       0142 SCONT4  CMPB  1,X
30EF 2703       0143         BEQ   SCONT5
30F1 17017A     0144         LBSR  ERROR
                0145 *RESTORE ALL BYTES
30F4 E68D01FB   0146 SCONT5  LDB   UPPER,PCR
30F8 E701       0147         STB   1,X
30FA E68D01F6   0148         LDB   TARGET,PCR
30FE E784       0149         STB   ,X
3100 E68D01F1   0150         LDB   LOWER,PCR
```

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```
3104 E71F                  STB   -1,X
3106 AC8D01E7              CMPX  MEMEND,PCR   HAS ALL MEMORY BEEN TESTED
310A 102701CA              LBEQ  DONE         IF ALL MEMORY TESTED
310E AC8D01DD              CMPX  TEMP,PCR     ARE WE IN THE PROGRAM AREA
3112 1026FF79              LBNE  SLOOP        NO KEEP GOING
3116 308D01DD              LEAX  EXIT,PCR     FIND PROGRAM END
311A 16FF72                LBRA  SLOOP        GO TO IT

311D 8E0000         LONG   LDX   #0           FIRST LOCATION

3120 E684           LLOOP  LDB   ,X           SAVE BYTE IN B
3122 6F84                  CLR   ,X           CLEAR TARGET BYTE
3124 4F                    CLRA               CLEAR COMPARATOR
3125 A184           LCONT  CMPA  ,X           COMPARE
3127 2703                  BEQ   LCONT1       IF EQUAL NO ERROR
3129 170142                LBSR  ERROR        REPORT THE ERROR
312C 6C84           LCONT1 INC   ,X           INCREMENT TARGET ADX
312E 4C                    INCA               INCREMENT COMPARATOR
312F 8100                  CMPA  #0           ALL COMBINATIONS TESTED?
3131 26F2                  BNE   LCONT        NO DO IT AGAIN
3133 E780                  STB   ,X+          RESTORE BYTE AND POINT TO NEXT ONE
3135 AC8D01B8              CMPX  MEMEND,PCR   ARE WE FINISHED
3139 1027019B              LBEQ  DONE         YES
313D AC8D01AE              CMPX  TEMP,PCR     PROGRAM AREA?
3141 26DD                  BNE   LLOOP        DO ANOTHER LOCATION
3143 308D01B0              LEAX  EXIT,PCR     GO  AROUND PROGRAM AREA
3147 20D7                  BRA   LLOOP        GO DO IT AGAIN

3149 AD9FA002       DISP1  JSR   [CHROUT]     SEND A CHAR TO SCREEN
314D A6A0           DISPLA LDA   ,Y+          GET A CHAR
314F 26F8                  BNE   DISP1        PRINT IT
3151 39                    RTS                RETURN

                    *SCREEN MESSAGES X'S WILL BE FILLED IN WITH
                    * CORRECT VALUES IN ERROR ROUTINE

3152 20             HEADER FCS   /     MEMORY DIAGNOSTIC 64K     <0D>SHORT OR LONG?/
3182 0D             ERMSG  FCS   /<0D>DATA ERROR:<0D>ADDRESS=XXXX<0D>EXPECTED DATA=XX<0D>ACTUAL
 DATA=XX/
31BC 0D             CONTN  FCS   /<0D>WANT TO CONTINUE? (Y OR N)/
31D8 0D             LAST   FCS   /<0D>DIAGNOSTIC COMPLETE<0D><0D>**PRESS ANY KEY TO CONTINUE**/
320C 43             MSG1   FCS   /COLOR COMPUTER MEMORY DIAGNOSTIC<0D>  !ENTER MEMORY SIZE (1-4
)<0D><0D>  1) 16K<0D>  2) 32K<0D>  3) 64K<0D>  4)ABORT/

326E 3436           ERROR  PSHS  D,X,Y        SAVE REGISTERS
3270 AF8D0078              STX   LOCTN,PCR    SAVE LOCATION
3274 A78D0076              STA   AREG,PCR     SAVE GOOD VALUE
3278 318DFF06              LEAY  ERMSG,PCR    FIND ERROR MSG
327C 31A815                LEAY  21,Y         POINT TO OUTPUT BUFFER
327F 308D0069              LEAX  LOCTN,PCR    CONVERT THE LOCATION TO ASCII
3283 8D2E                  BSR   CONVRT
3285 3121                  LEAY  1,Y          NEXT OUTPUT LOC
3287 8D2A                  BSR   CONVRT       CONVERT IT
3289 31A810                LEAY  16,Y         OUTPUT LOCATION DATA EXPECTED
328C 8D25                  BSR   CONVRT       CONVERT IT
328E AE62                  LDX   2,S          GET OLD X VALUE
3290 312E                  LEAY  14,Y         LOCATION FOR ACTUAL VALUE
3292 8D1F                  BSR   CONVRT       CONVERT
3294 318DFEEA              LEAY  ERMSG,PCR    FIND ERROR MSG
3298 17FEB2                LBSR  DISPLA       WRITE IT TO SCREEN
329B 318DFF1D              LEAY  CONTN,PCR    FIND CONTINUE MESSAGE
329F 17FEAB                LBSR  DISPLA       WRITE IT
32A2 176F1C         ANSWER LBSR  GETCHR
32A5 27FB                  BEQ   ANSWER       KEEP LOOKING
32A7 AD9FA002              JSR   [CHROUT]     ECHO ANSWER
32AB 8159                  CMPA  #'Y          IS IT A YES?
32AD 2702                  BEQ   GOBACK       YES GO BACK WHERE YOU CAME FROM
```

```
32AF 2027          0216        BRA   DONE
32B1 35B6          0217 GOBACK PULS  D,X,Y,PC     RETURN
                   0218
32B3 A684          0219 CONVRT LDA   ,X           GET FIRST BYTE
32B5 84F0          0220        ANDA  #$F0         GET LEFT 4 BITS
0004               0221        RPT   4
                   0222        LSRA
                   0223        ENDR
32B7 44                 +      LSRA
32B8 44                 +      LSRA
32B9 44                 +      LSRA
32BA 44                 +      LSRA
32BB 8109          0224        CMPA  #9           IS THIS A NUMBER
32BD 2E04          0225        BGT   LETR         NO ITS A LETTER
32BF 8B30          0226        ADDA  #$30
32C1 2002          0227        BRA   CONCNT
32C3 8B37          0228 LETR   ADDA  #$37         CHANGE IT TO ASCII
32C5 A7A0          0229 CONCNT STA   ,Y+          PUT IT IN OUTPUT STRING
32C7 A680          0230        LDA   ,X+          GET IT AGAIN
32C9 840F          0231        ANDA  #$0F         GET RIGHT BITS
32CB 8109          0232        CMPA  #9
32CD 2E04          0233        BGT   LETR1
32CF 8B30          0234        ADDA  #$30
32D1 2002          0235        BRA   CNCNT
32D3 8B37          0236 LETR1  ADDA  #$37
32D5 A7A4          0237 CNCNT  STA   ,Y
32D7 39            0238        RTS
                   0239
32D8 318DFEFC      0240 DONE   LEAY  LAST,PCR
32DC 17FE6E        0241        LBSR  DISPLA
32DF BDA1C1        0242 DONE1  JSR   GETCHR       IS THERE A KEY PRESSED
32E2 27FB          0243        BEQ   DONE1
32E4 1CA0          0244        ANDCC #$A0         RESTORE INTERRUPTS
32E6 B7FFDE        0245        STA   $FFDE        TURN OFF 64K MODE
32E9 7EA027        0246        JMP   $A027        GO TO BASIC RESET ROUTINE
32EC               0247 LOCTN  RMB   2
32EE               0248 AREG   RMB   1
32EF               0249 TEMP   RMB   2
32F1               0250 MEMEND RMB   2
32F3               0251 UPPER  RMB   1
32F4               0252 TARGET RMB   1
32F5               0253 LOWER  RMB   1
32F6               0254        RMB   1
32F7 12            0255 EXIT   NOP
3000               0256        END   START
         NO ERROR(S) DETECTED
```

```
  SYMBOL TABLE:

.16K   3025    .32K   3035    .64K   3045    .MSIZE 3002
ANSWER 32A2    AREG   32EE    CHROUT A002    CNCNT  32D5
CONCNT 32C5    CONTN  31BC    CONVRT 32B3    DISP1  3149
DISPLA 314D    DONE   32D8    DONE1  32DF    ERMSG  3182
ERROR  326E    EXIT   32F7    GETCHR A1C1    GETSIZ 300C
GOBACK 32B1    HEADER 3152    INPUT  3070    LAST   31D8
LCONT  3125    LCONT1 312C    LETR   32C3    LETR1  32D3
LLOOP  3120    LOCTN  32EC    LONG   311D    LOWER  32F5
MEMEND 32F1    MOVE   3056    MSG1   320C    NARG   0000
SCONT  30B3    SCONT1 30C5    SCONT2 30CC    SCONT3 30DB
SCONT4 30ED    SCONT5 30F4    SLOOP  308F    START  3000
TARGET 32F4    TEMP   32EF    UPPER  32F3    WRTHDR 3066

CMD=MEMDIAG.TXT >/P
```

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The Secret to Loading Those Double-Speed Tapes

By Craig Carmichael

> ***"Too many people buy disk drives because cassettes are slow to use, without realizing that the full speed of the cassette is not exploited."***

Have you got lots of long files to CLOAD and CSAVE? Or, have you accidentally taped your favorite game at double speed? Anyone who is familiar with the Color Computer, and whose POKE 65495,0 works, is probably also familiar with the double-speed CSAVE. These individuals also know that a simple POKE 65495,0, unfortunately, does not enable them to load the tapes back into the computer.

The problem is this: POKE 65495,0 takes the Color Computer from "slow" (normal) clock mode to "address-dependent" mode. In address-dependent mode, the computer runs at normal speed when the memory being accessed is RAM, from zero to 32767, and at double speed when accessing ROM, 32768 and up (BASIC, Extended BASIC). During a CSAVE, there aren't many calls to RAM, so the operation is nearly double speed. However, CLOAD makes considerable use of RAM, and thus does not operate at the same speed as the CSAVE. The exasperating thing is that double-speed tapes are perfectly good! All we need is a way to load them.

The first method I tried involved connecting my tape recorder's drive belt to a variable speed electric drill and running the tape recorder at my guess of half speed! As an emergency measure, it had its merits, working about one time in four with a steady hand, but this is not the method I shall detail here.

My next idea was to rewrite the cassette routines as machine language utility programs, which could be run as much as three times as fast as the regular ones, but luckily, other commitments and procrastination eliminated this idea.

Then I got a copy of *The Facts for the TRS-80 Color Computer* (a technical book by Spectral Associates, $15.95)

(Craig Carmichael is a British Columbia Institute of Technology digital electronics graduate who has learned machine language programming at home. His favorite chip is the 6809. He is presently designing and programming industrial computers for heating system control. Craig and his wife, Carla, live in Victoria, British Columbia.)

and browsing through it, I noticed an overlooked detail. Memory Locations 8F, 90 and 91 Hex in RAM determine the width of pulses the computer accepts as a '0' or a '1' from the tape. So, here is the priceless secret: After you `POKE 65495,0`, `POKE 143,15:POKE 144,20:POKE 145,7` and all those double-speed tapes will load perfectly!

Too many people buy disk drives because cassettes are slow to use, without realizing that the full speed of the cassette is not exploited. The cassette interface on my homemade computer runs at 4.5K Baud, three times the regular speed of the Color Computer's.

I usually program in machine language, and I have now incorporated the double-speed cassette functions as an automatic feature of my assembly editor and as an optional feature of my test editor for saving lengthy files. I have had no I/O Errors using double speed, except with a bad tape. There is, of course, less possibility of running over a bad section of tape since the programs save in a shorter time!

Comments

1) To recap: When recording, simply use `POKE 65495,0 "DOUBLE SPEED POKE"`, and when loading, use `POKE 65495,0` with `POKE 143,15:POKE 144,20:POKE145,7`.

2) If your computer doesn't work in address-dependent mode, see Page 78 in the January 1983 RAINBOW for ideas on how to get it running.

3) To get back to regular speed loading without turning off the computer, `POKE 65494,0:POKE 143,18:POKE 144,24:POKE 145,10`.

4) If your tapes don't load flawlessly, you could try `POKE 146,1` (or more) before you record to increase the length of leader tape sent at the start of each block, since this is the most common trouble spot with any tape. Next, tape recorders that have a manual record level adjustment make better quality recordings than those with ALC record levels.

5) You could also try changing the `POKE` values at 143, 144 and 145. The values given are simply the first ones that gave me good results.

6) If all else fails, get a couple of adapters and hook up your stereo cassette deck. I confess to using an AKAI CS-34D at all times, which means I am only guessing about whether many people will have trouble with portable tape recorders at the higher speed.

Rules

1) Use double speed only for your personal tapes. Even if others know how to load a tape at double speed, they won't be expecting to receive a tape in this format. The regular speed *is* standard.

2) Clearly indicate on the cassette label "FAST" when you have recorded a tape at double speed.

Due to speed differences between cassette recorders, the `POKE` values may have to be adjusted a bit if a program is `CSAVE`d on one unit and `CLOAD`ed with another model of cassette recorder.

There you have it! So simple, yet such a timesaver if you do a lot of `CSAVE`ing and `CLOAD`ing, and a lifesaver if you've accidentally saved a tape at double speed.

(You may write to the author with any questions at 820 Dunsmur Road, Victoria, British Columbia, Canada, V9A 5B7. Please include an SASE.)

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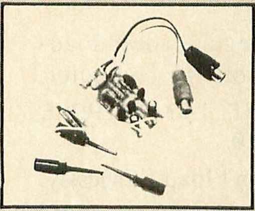

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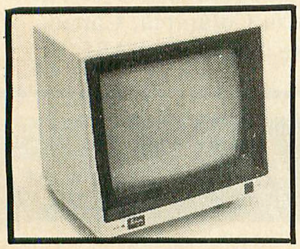

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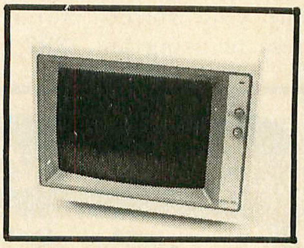

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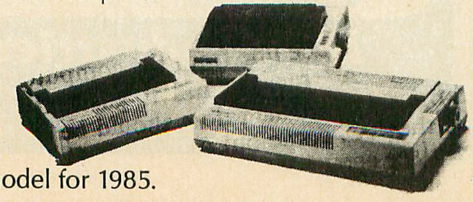

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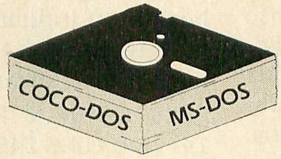

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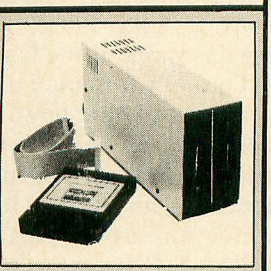

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The Mark Data Products Accounting System is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P & L or income report, an interim or trial balance and a balance sheet.

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. **ONLY $99.95**

ORDER ENTRY SYSTEM

The Mark Data Product sales order processing system provides a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

This order entry software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. **ONLY $99.95**

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Easy-Edit is a versatile, easy to use text editor which is particularly convenient for assembly language and BASIC programming. This editor offers powerful text handling capabilities along with many special features including a built-in disc operating system, 32/64K memory sense, a 51 character by 24 line screen, auto key repeat, extensive error reporting, and complete compatibility with popular assemblers. Requires 32K and at least one disc drive. Master disc and instructions are packaged in an attractive 3-ring binder. **$34.95**

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Need a good mailing list or customer list program? How about a program to keep track of your investments, your computer magazines, or record collection? Do you have an inventory of all household items for insurance purposes? **EASY-FILE** will do all of these things and many more. The **EASY-FILE** master disc and instructions are packaged in an attractive 3-ring binder. Requires 32K and at least one disc drive.

Order Yours Now! Get Organized for Only $59.95!

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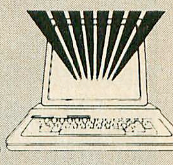
The Color Computer Supercharger



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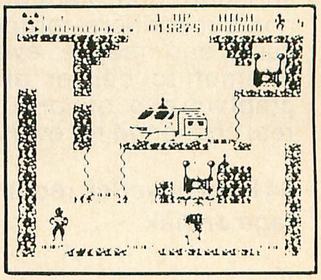

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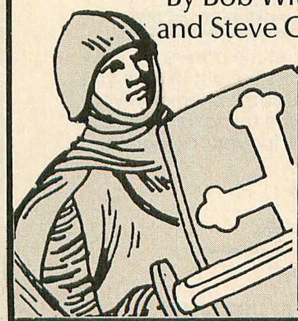

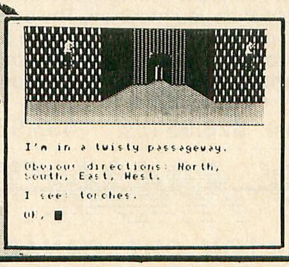

```
I'm in a twisty passageway.

Obvious directions: North,
South, East, West.

I see: torches.

W, █
```

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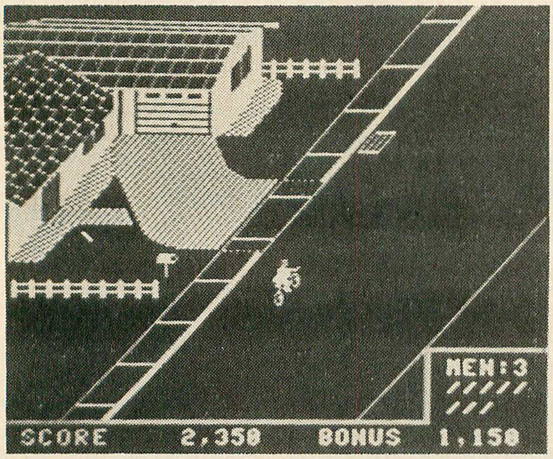

As a paper boy, you ride your bike along your route delivering papers to your customers. Break customers' windows or damage their property and they will cancel their subscriptions! Earn bonus points by damaging non-subscribers' property. Avoid pedestrians, cars, and maybe even a mad dog in your attempt to deliver all your papers! Detailed graphics and lots of surprises make this game a real challenge for everyone.

64 k and joystick required
tape or disk

$28.95 U.S.
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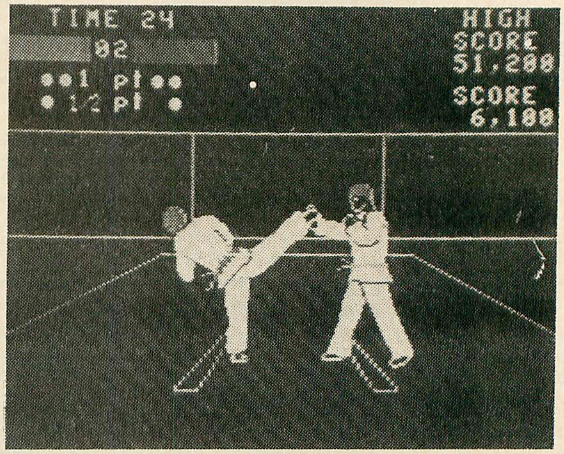
KARATE

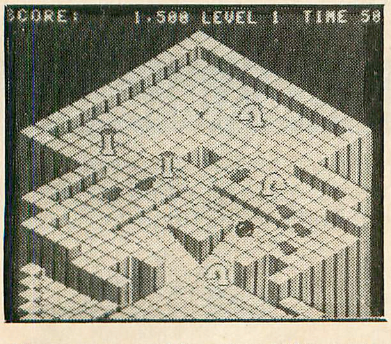


Challenge the computer, or a friend to a Karate match! You can even challenge an opponent across town if you have a modem. In this game, you will use various Karate punches and kicks to knock your opponent down and earn points to win the match. When challenging the computer, your opponent's Karate skills increase as you win matches. This game is a challenge for even the expert game player.

64 k and joystick required
tape or disk

$28.95 U.S.
$38.95 Can.

MARBLE MAZE

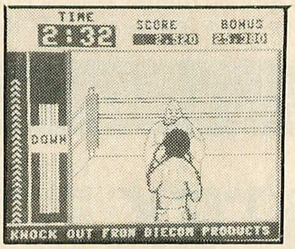


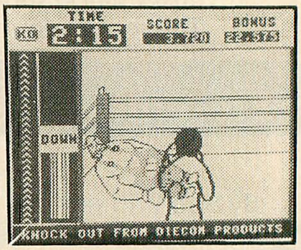
Move your marble around the mazes in your search for the finish line! Avoid the marble eaters, acid puddles and other creatures that inhabit the mazes. Avoid falling into holes or off the edges of the maze. Eight different levels and great graphics make this game a must for your collection. Congratulations to the contest winners!

64 k and joystick required

tape or disk **$28.95** *U.S.*
$38.95 *Can.*

KNOCK OUT





Fight against five different boxers in this great boxing game! At first the boxers are easy to knock out, but beware, it gets harder as you move on. The boxers are out to stop you in your quest to become champion of the world. But once you become champion your task is not over. You will then have to defend your title against those trying to regain the championship from you. Outstanding graphics make this a must for your collection!

64 k required

tape or disk **$28.95** *U.S.* **$38.95** *Can.*

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The RAINBOWfest Reporter

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Prospect, Kentucky
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Editor: Tamara Dunn
Writer: Jeffrey S. Parker

Nearly 13,000 break attendance record at RAINBOWfest-Princeton

Princeton, N.J. — Nearly 13,000 people thronged to Princeton, New Jersey, Oct. 11-13 for the largest RAINBOWfest to date. Under rainy and cold New England fall skies, the record-breaking crowd arrived at the Hyatt Regency-Princeton Hotel to hear seminars on the latest developments in the CoCo Community, see new products being introduced, like *CoCo Max II* and *PenPal*, purchase disk drives for well under $100, and have an opportunity to meet noted members of the CoCo Community.

The keynote speaker for this RAINBOWfest was Bill Barden, author of some 30 books and Color Computer technical expert. Bill's words at the Community Breakfast were optimistic as he spoke of a strong future for the CoCo and said that "Radio Shack will be around forever."

CoCo users came from as far away as Canada and even Australia to speak with OS-9 expert, Dale Puckett, about his new book. Many favorite CoCo celebrities and software and hardware dealers came to Princeton, such as Frank Hogg, who kept busy demonstrating his powerful new OS-9 machine, the QT+, running OS-9/68K. Also seen in the crowd were such notables as Terry Kepner, Tony DiStefano, Dan Downard and Wayne Day, who ran the CompuServe CoCo SIG right from the exhibit hall of RAINBOWfest.

The Radio Shack booth had show specials on everything from CoCos and Model 100s and 200s to Tandy 1000s, software and peripherals.

When attendees were not crowding into the exhibit hall, a myriad of seminars on many aspects of CoCo computing were filled to capacity . The topics ranged from graphics to telecommunications, and included question-and-answer seminars.

Interest in OS-9, Tandy's powerful operating system, continued to grow in Princeton. Two seminars were given by Dale Puckett, co-author of *The Complete Rainbow Guide to OS-9*. The topics covered OS-9 and BASIC09 for beginners, and attracted more people than could fit into the seminar rooms.

An interesting feature that added to the fun and excitement of this RAINBOWfest was the concurrent running of PCMfest, hosted by Falsoft's sister publication PCM The Personal Computer Magazine for Tandy ® Computer Users, focusing on Tandy's MS-DOS and portable computers. PCMfest gave Color Computer users an opportunity to view what many consider the next logical step — MS-DOS.

Thunder RAM thunders out the door

The first 256K memory expansion board for the Color Computer, by Spectrum Projects of Woodhaven, New York, was a smash hit at Princeton RAINBOWfest. Selling for just $99.99, by noon Saturday Bob Rosen was entirely sold out of *Thunder RAM*. This board features the capability to load four 32K programs at once, has a 60K print spooler and can emulate a 40-track RAM disk.

Also popular was the new Spectrum *Super Controller*, allowing up to four DOSs to be implemented from the same controller. *OS-9 Solution*, user-friendly software for the OS-9 environment, and *Telepatch 64*, an enhancement to *Telewriter-64* that includes a print spooler, sold for just $19.95. OS-9 users in particular were interested in both *Thunder RAM* and the OS-9 driver for it, which sells for $24.95.

CoCo Max II has its debut

New from Colorware is *CoCo Max II*, the latest version of one of the most popular Color Computer products ever. Tim Jenison, who developed *CoCo Max* and the new *CoCo Max II*, was kept busy at Colorware's booth demonstrating all the new features of *CoCo Max II*.

The new version includes all of the existing features plus 14 new fonts, a dynamic two-dimensional shrink and stretch, click to load, rotate, multiple drive capability and a clipboard of graphics stamps.

The Colorware booth stayed about 10 people deep as RAINBOWfest goers took advantage of the bargain show price of just $20 for the *CoCo Max II* upgrade.

Tim Jenison commented, "I think this is the best thing going now. Nobody else has these features to offer, especially the clipboard in memory. People just have to see it once, and then they have to have it." Tim proved to be right, as Colorware had almost run out of *CoCo Max II* packages by Saturday afternoon.

Even disguised as a convict, the glasses gave him away

We've seen him with a long beard. We've seen him clean-cut. Now we've seen him with a shaved head, wearing convict's clothes! Dennis Kitsz entertained and amused us all at yet another RAINBOWfest. This time, Dennis, owner of Green Mountain Micro of LowerKit III fame, and publisher of the now defunct *Under Color* Magazine, appeared as a convict.

"I had to shave my head recently," he explained. "Someone said I look like a convict now that it's just starting to grow back, so I figured I might as well dress the part!" And dress it he did. He even gave a well-attended seminar, entitled "Your Own Color Computer Hardware," dressed as a con.

Dennis can always be recognized by his distinctive eyeglasses, which no matter what his attire, reveal his true identity. Along with his *Micro Language Lab, Color Quaver* and expansion interface cables, Dennis is best known for his outstanding customer support.

Rosen of Spectrum Projects discovers new CoCo

Yet another CoCo version was discovered on Saturday by Bob Rosen of Spectrum Projects. This version features three ways to upgrade your CoCo and bears the new Tandy Color Computer nameplate. Until now, it had been thought that the new CoCo 2 manufactured in Korea was the only new version released. Could this be a portent of the elusive and unknown CoCo 3?

For Your Health Software introduces *House Doc*, a home medical/diagnostic program

New to the CoCo Community is For Your Health Software, developer of *House Doc*. This program was written and developed by Dr. Darrell Wells, M.D./Ph.D., and is designed to cut medical costs, treat illness at home and educate the user about diseases.

House Doc can diagnose more than 48 diseases or ailments, and Dr. Wells spent most of the show demonstrating it to prospective buyers. The program uses a unique series of matching and evaluation of symptoms entered by the user to arrive at a possible diagnosis. *House Doc* then gives several possible diagnoses, listing the percentage probabilities of which illness you might have and its recommended treatment. In several cases, the recommendation is to seek medical help from a professional physician.

Howard Medical slashes monitor prices

Howard Medical Computers of Chicago, Illinois, slashed its monitor prices during the show, dropping the bottom out of the price war and leaving no clear second place.

The company featured a Zenith 13-inch 131 color monitor, with RGB and composite input, built-in speaker and 240 by 200 dot resolution for $168. The package usually has a retail price of $344.

Amidst the flurry of sales of these monitors, the price for a high resolution Zenith 123A 12-inch monochrome monitor was cut to $67.50. The monitors carry a 30-day, money-back warranty. These were the stars in a presentation of printers, stands, drives and other accessories offered at special prices.

L.R. Technology connects three CoCos

Manufacturing and designing peripheral equipment for personal computers, and the CoCo in particular, is L.R. Technology of Warrington, Pennsylvania. L.R. Technology introduced its hard disk interface, its EPROM programming system and its multipurpose interface module. Among other things, this multipurpose interface module allows up to three CoCos to be connected and used together.

Attendees at the L.R. Technology booth inspected this exceptional new system. This system has excellent applications for the business user or serious OS-9 enthusiast. The interface includes two RS-232 ports, a parallel printer port and a real-time clock with a battery backup. This multipurpose package substantially enhances the power and performance of the Color Computer.

Prickly-Pear presents new graphics Adventure

Joanne Chintis had her hands full in the Prickly-Pear Software booth without the aid of her husband and co-owner, Mike. Excited CoCo fans mobbed the booth to see the new two-disk graphics Adventure *Hall of the King*. The Adventure features high quality, fast-paced graphics and text displays, extensive game save features and a real challenge.

Prickly-Pear's new *Hall of the King* comes only a few months after the introduction of *To Preserve Quandic*, which is a two-disk Adventure also in 300K length.

Also on display were the new *Warp Factor X*, designed as a *Star Trek* Simulation by a NASA engineer; *Dr. Who*, a graphics and arcade game based on the British TV series of the same name; and an artificial intelligence program called *Crystal*.

CompuServe raffles off free connect time

Wayne Day, SysOp of the Color SIG, and CompuServe hosted a raffle with a prize of several hours of free connect time on CompuServe. A new winner was announced every hour. Day also ran the SIG right from the exhibit hall during the show.

Also in the booth was Mike Ward, author of the public domain terminal program *MikeyTerm*. They were deluged with questions about CompuServe and the SIGs. People who had only known Day and Ward through their computer screens were thrilled to make face-to-face introductions with their SIG friends. Said Day, "It's not just the raffle. It's been so busy here, I get finished shaking one hand and there's another in front of me. It's been wall-to-wall people. People are fascinated with learning more about CompuServe and getting their questions answered."

Frank Hogg's new QT+ is put on display

Frank Hogg Labs has recently introduced the QT+ package. This machine is not much larger than a CoCo, but is a powerful new machine based on a Motorola 68000 chip and operates under the new OS-9/68K operating system. This multi-user system is very fast and powerful indeed, and compant president Frank Hogg spent quite a bit of time at RAINBOWfest showing off the virtues of his new QT+. Interest in this machine was quite high, particularly among the many OS-9 users present.

According to Hogg, "This machine is so powerful running OS-9/68K that nothing can even come close. We have all the software needed to support it, too. This is an OS-9 user's dream come true!" In addition to the QT+, FHL had many software and hardware items available at special show prices.

Four Star Software heralds *PenPal* integrated software

Four Star Software of Ontario, Canada, introduced its new *PenPal* integrated software. Featuring a Hi-Res 51 by 24 screen and full telecommunications capabilities, this package also includes a text editor, spreadsheet, graph generator and database program.

PenPal is designed to be user friendly. Twelve function keys and a command reminder as well as online help are always available to the user. All of *PenPal*'s modules interface with one another.

Because the program is designed to be learned in a day and is very easy to use, interest was high in this innovative new development. With so many powerful features, and at the special price of $69.95, show-goers leaped at this one-time-only opportunity.

Computer Plus cuts price of the Gemini SG-10

Computer Plus of Littleton, Massachusetts, was in fine style at this RAINBOWfest. Their big show special was the Gemini SG-10 package for $225, a price that could not be matched. In addition to huge discounts on printers, Computer Plus also discounted all prices on Radio Shack equipment and software by 10 to 20 percent. Computer Plus is an authorized Radio Shack dealer and well-known for its excellent prices and incomparable customer support.

J&M Systems, Ltd. introduces 3½-inch Winchester with OS-9 driver

J&M Systems, Ltd., of Albuquerque, New Mexico, featured its new JFD-CP controller. This controller has ROM sockets for both Disk BASIC and J-DOS 1.2. The controller features a switch to toggle between DOSs. Also built into the new CP controller is an eight-bit parallel port for printer support. The port can be used to drive a Winchester hard disk drive. With its gold contacts, this controller is among the most sophisticated pieces of equipment for the CoCo.

In addition to the JFD-CP controller, J&M also introduced its new 3½-inch 10-megabyte Winchester hard drive for the CoCo. This drive is small, fast and efficient, and with its massive storage capabilities and OS-9 driver, came under serious consideration by avid OS-9 users. J&M Systems also featured 5-, 10- and 20-meg hard drives for the CoCo.

Price war erupts between Southwestern Digital and Computer Center

Southwestern Digital and Computer Center went toe to toe on disk drive prices. From the start, these two companies' prices were only a few dollars apart, but by Sunday, the price war had grown to epic proportions as attendees flooded the booths in an impassable barrier of buyers.

The winner? The RAINBOWfest attendees, of course, as Southwestern Digital dropped their price for a single-sided, double-density Drive 0 with a J&M controller to just $130.

The Computer Center came in right behind with a price tag of $134 for a single-sided, double-density Drive 0 with Radio Shack controller.

Falsoft arrives in full force, fine style

"When someone comes to a RAINBOWfest," said Lonnie Falk, publisher of RAINBOW and PCM magazines, as he gazed over the Saturday afternoon crowd, "I want them to know they have come to something special. This is an event, an important happening. People need to know that, particularly after coming all this way to see it."

Lonnie took the time at the CoCo Community Breakfast to introduce well-known CoCo Community personalities and most of the members of his staff from Falsoft, Inc. He commented on the trials and tribulations involved in moving into a new building, which was Falsoft's current big matter at hand. "Our move-in date is in the middle of November," he commented, "but we've been hearing about occupancy next month since last year! I'll believe it when we've moved in."

Lonnie was also presiding over a new show, PCMfest, running concurrently with RAINBOWfest for the first time. He was pleased both with the results of the show and the CoCo Community's reaction to this added attraction at RAINBOWfest.

The Falsoft booth had its hands full as Submissions Editor Jutta Kapfhammer and RAINBOW Technical Editor Dan Downard, together with Danny Humphress of PCM Magazine and Willo Falk, RAINBOWfest site manager, attempted to handle the swarm of eager attendees. Falsoft was selling its full line of products: RAINBOW magazines, binders, books and RAINBOW ON TAPE. Falsoft also introduced *The Second Rainbow Book of Adventures* at the show.

"The CoCo is so much more than a game machine," said Falk. "When people come to an event like this and show their support, you can feel it in the air. Serious products like OS-9 show it, and the people prove it. The future for this machine is a strong future, and the people know it. Falsoft is strong, too, and getting stronger all the time. When people come to a RAINBOWfest they know we'll always be there to support them."

MichTron debuts *Rommel 3D*

MichTron, Inc. of Pontiac, Michigan, introduced its newest arcade-style game, *Rommel 3D*. This fast-paced action game is controlled from the keyboard with the arrow keys, and is a remarkable version of the popular arcade game involving tanks on a battlefield. The game is true to the original, including smart tanks and radar, a pause game feature and extremely high quality 3-D graphics that will delight the user.

In addition to *Rommel 3D* being sold at a special show price of $24.95, MichTron featured other well-known software and hardware specials both for the CoCo and Tandy 1000.

Moreton Bay Software highlights new RAM Disk

Moreton Bay Software stayed busy as Steve Bjork, of *Bjork Blocks* fame, demonstrated his newest program, *Motion Pictures*. This graphics editor makes extensive use of layers and foreground/background image processing.

Also highlighted was the new killer video 256K, featuring a 16-color, 80-column CoCo 2 with an internal RAM Disk, and More Keys, the keypad developed for serious number crunching, was on display. A great deal of attention was paid to *Hot Slot*, a casino Simulation program — not just another slot machine!

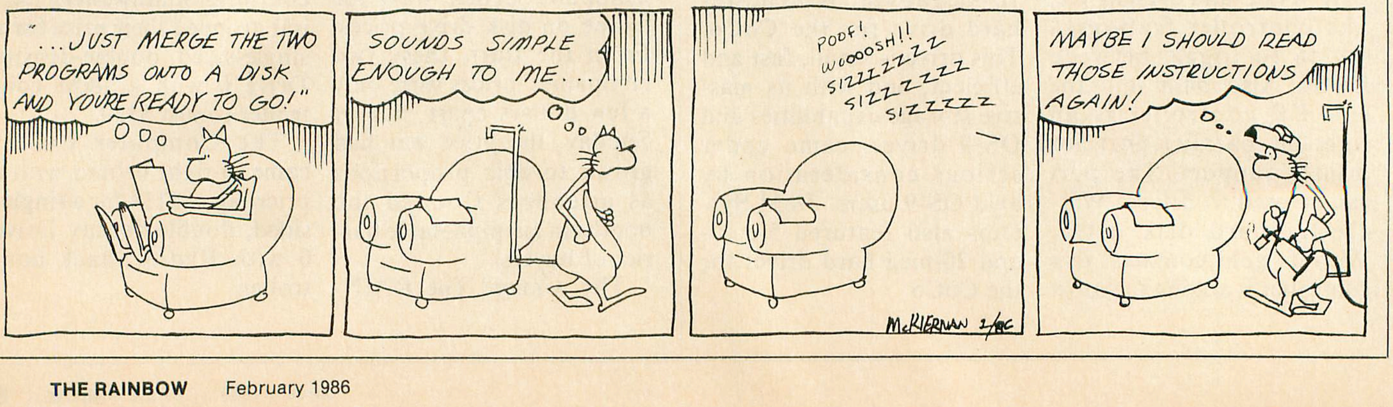
Don't panic!

If you missed RAINBOWfest-Princeton, or if you were there and can't wait for the next one, come join us February 14-16 in Palo Alto, California.

The Hyatt Hotels will again be our host, and special room rates of $71 per night will be offered. Advance tickets may be ordered until February 7, 1986.

Come and meet your favorite authors and CoCo personalities, as well as view all the latest in "CoCo-ware." Don't miss it!

CoCo Cat


"...JUST MERGE THE TWO PROGRAMS ONTO A DISK AND YOU'RE READY TO GO!"
SOUNDS SIMPLE ENOUGH TO ME...
POOF!
WOOOOSH!!
SIZZZZZZZ
SIZZZZZZZ
SIZZZZZZ
MAYBE I SHOULD READ THOSE INSTRUCTIONS AGAIN!
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VOLKSMODEM (See Below)	$95.95	$99.95
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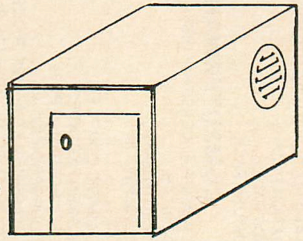

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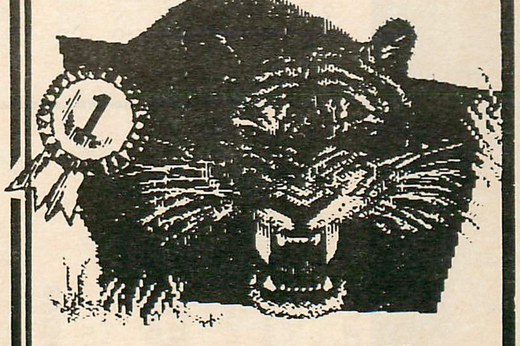

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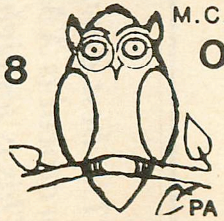

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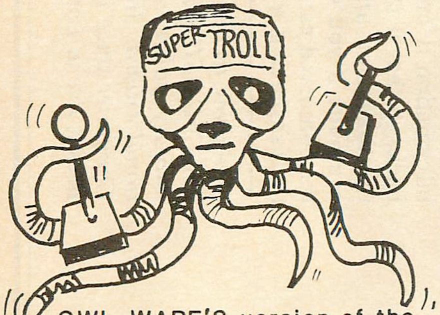

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DISK DRIVE PURCHASE!!!

DELPHI BUREAU

Some Notes on Downloading

By John R. Curl
Rainbow's CoCo SIGOP

> ***"The best download protocol is XMODEM. This is an eight-bit, error-free checksum file transfer. To do an XMODEM download, type XM and press ENTER at the action prompt."***

Welcome back to the "Delphi Bureau"! If one of your presents from Santa was a new modem, we welcome you to the wonderful world of telecommunications and invite everyone to join us on Delphi's CoCo SIG.

Since last month's column was an introduction to the CoCo SIG, this month I hope to give you some insight on the workings of the CoCo SIG. The abbreviated, modified "Delphi Command Card" has been printed with Delphi's permission for RAINBOW readers. It contains the commands and options used in the major areas of Delphi, including the CoCo SIG. The information is on one page, front and back, so that it may be removed from the magazine and kept beside your computer if you wish. One note about the command card: Whenever it refers to transferring a file to your disk, it actually means to your *buffer.* Delphi automatically transfers to disk only if your terminal program supports this feature.

THE RAINBOW staff has been hard at work continually trying to enhance the CoCo SIG. Back issues of RAINBOW ON TAPE are being uploaded to the RAINBOW ON TAPE topic section of our database. The source code listings for machine language programs and the OS-9 listings from THE RAINBOW are also being uploaded into the RAINBOW ON TAPE section. This is one thing that we are unable to include on the RAINBOW ON TAPE cassette.

We now have our "Shopping Service" fully activated. You can order various products or services from this area: individual cassettes of RAINBOW ON TAPE or a year's subscription, RAINBOW magazine binders, books from The Rainbow Bookshelf. You can even subscribe to or extend your subscription to RAINBOW magazine. Soon, you should be able to purchase products from other vendors in the "Shopping Service." This is an attempt to serve you quickly and more efficiently.

Because of a need expressed by our

(Rainbow technical assistant and Delphi CoCo SIGOP John Curl is also a military policeman in the Army National Guard. He has had his Color Computer since 1982. He and his wife, Becky, live in Louisville, Kentucky.)

DELPHI™

> This abbreviated, modified version of Delphi's command card has been created to help our readers who use Tandy® Color Computers get started quickly on Rainbow's new COCO SIG. It is being reproduced here for your convenience and can be removed, if you wish, and kept near your computer for easy reference.

WELCOME TO DELPHI

Most Delphi commands are self-explanatory. This card will serve as a handy backup reference.

Signing onto Delphi Directly

1. Dial (617)-576-0862.
2. When you have carrier, press [ENTER] once or twice.
3. At "USERNAME" type your membername and [ENTER].
4. At "PASSWORD" type your password and [ENTER].

How To Sign On Using Uninet

1. Dial your local Uninet number.
2. Hit [ENTER] [.] [ENTER] at the |x| or "L?" prompt.
3. Type DELPHI or GVC at the SERVICE prompt.
4. Then type your USERNAME and PASSWORD as outlined above.

How To Sign On Using Tymnet

1. Dial your local Tymnet number.
2. When "PLEASE TYPE YOUR TERMINAL IDENTIFIER" appears, type A.
3. When "PLEASE LOG IN" appears, type DELPHI.
4. Then type your USERNAME and PASSWORD as outlined above.

How To Sign On Using Datapac (Canada)

1. Dial your local Datapac number.
2. Type [.] for 300 baud or [.] [.] for 1200 baud.
3. Type Set 2:1, 3:126 for full duplex allowing deletes.
4. Type p 1 3106, DELPHI; [ENTER] (Tymnet)
5. Then type your USERNAME and PASSWORD as outlined above.

To obtain your local access number you may call Tymnet at 800-336-0149 or Uninet at 800-821-5340. If you have problems at any time, call Delphi toll-free at 1-800-544-4005. (Mass. 617-491-3393)

Note: Most commands require only enough letters to be entered to make them unique. For example, to enter CONFERENCE from the Main Menu, simply type "C" and [ENTER]. Do not press [ENTER] after commands using the Control Keys. Most other commands require pressing [ENTER] to activate them.

Typing BYE from any prompt (except the MAIL prompt) will log you off of Delphi.

Typing [?] [ENTER] will generally display a full menu or provide help.

IMMEDIATE COMMANDS (Can be used at any time.)

/HELP — lists Immediate Commands.
/ECHO — turn on character echo.
/NOECHO — turn off character echo. (Used after setting terminal or Uninet or Tymnet node to produce echo.)
/EXIT — exit to next higher menu or command level.
/GAG — turn off incoming /PAGE or /SEND messages.
/LENGTH — shows current number of lines per page on your screen or sets new length.
/NOGAG — turn on incoming /PAGE or /SEND messages after using /GAG.
/PROMPT (1, 2, or 3) — 1=no menu, no explanation; 2=no menu, some explanation; 3=menu plus explanation.
/TIME — show current Eastern time and date.
/WHOIS (username) — shows profile of member (if available).
/WIDTH — shows current screen width format or sets new width.

DATABASE

DIRECTORY — display a directory of all files in the topic.
EXIT — exit database.
HELP — get help on database actions and commands.
READ — read a description of a file. (You must read the file before you download it.)
SEARCH — search a topic by keyword.
SET TOPIC — switch from one topic to another without leaving the database section.
SUBMIT — submit a file for inclusion in a topic. The file must be in your workspace.
WORKSPACE — enter your workspace area.

In order to access a file, you must first READ (filename). Once you have read a file, the following actions are available:

DESCRIPTION — displays the file's description again.
DISPLAY — display/list the file on your screen.
DOWNLOAD — use with the buffer capture method of downloading.
EXIT — return to the database prompt.
HELP — get help on commands and actions.
LIST — like display; list a file in an unformatted format.
NEXT — advance to the next group or file. ([ENTER] defaults to NEXT.)
XMODEM DOWNLOAD — download the file using the Xmodem protocol.

WORKSPACE

Workspace is an area for you to store files and messages of all types. This is where you must first upload a file before submitting it to a database. You can file forum messages for retrieval later. Mail messages can be stored here.

From the COCO SIG> prompt type DA, and pick a topic, then type WO to reach Workspace.

APPEND — append one file to another.
CATALOG — shows which files you have created.
COMMON — go to the Delphi Common work area.
CREATE — creates file and stores it in your area.
DELETE — deletes files you no longer need.
DOWNLOAD — download a file from Delphi to your disk.
EDIT — create and edit your own text files.
EXIT — return to Main Menu.
HELP — explanation of WORKSPACE commands.
HOME — return home to your private work area.
LIST — lists contents of any file in your catalog.
PURGE — delete all but current version of duplicate files.
UPLOAD — upload a file from your computer to Delphi.
XDOWNLOAD — download via XMODEM protocol.
XUPLOAD — upload via XMODEM protocol.

COCO SIG FORUM

ADD — start a new message thread with a different topic.
BACK — moves backwards within a thread.
DELETE — delete a message.
DIRECTORY — display a directory of messages.
EDIT — edit the current message.
EXIT — exit forum.
FILE — put a copy of a message in your workspace.
FOLLOW — follow a message thread. Read only the messages of a particular thread.
FORWARD — send a copy of a message by mail.
HELP — get help on forum actions and commands.
HIGH — set/show the high message number.
MAIL — take you directly to mail.
NEXT — read next message. ([ENTER] defaults to NEXT.)
READ — read a message. (Typing message number will read that message.)
REPLY — reply to a message.
TOPICS — set/show message topic.

CONFERENCE

EXIT — return to Main Menu.
JOIN (groupname) — join existing group or start new one.
NAME (newname) — change your name or "handle".
PAGE (username) — pages another user in the system.
SCHEDULE — transfer you to the Conference Schedule.
WHO — lists all current users and Conference groups.
Conference Immediate Commands (use while in Conf).
/ACCEPT — accept another's page from within current group.
/ANSWER — respond to or decline PAGE from another user.
/CANCEL — terminate a PAGE to another user.
/EXIT — like CONTROL-Z; gets you out of wherever you are.
/GAG — disable /SEND's from people outside your conference group.*

/GLOCK — lock the group's attributes.*
/GNAME (newname) — change current group name.
/GPASS (password) — select a group password.*
/GPRIVATE — make the group private.*
/GQUIET — makes the group have silent entry and exit.*
/HELP — get help on conference actions and commands.*
/JOIN (groupname) — join an existing group.
/LOG — save a transcript of your conference in your workspace.*
/MAIL — takes you directly to Mail.
/NAME — create a conference nickname (handle).
/PAGE — ask another user to join your group.
/PASS (password) — say the password for admittance into password groups.
/REJECT — a pleasant "No thank you" to whomever is paging.
/REPEAT — turns Echo on or off.*
/RNAME (nickname) — show the username of a person using a handle.
/SCHEDULE — transfer you to the Conference Schedule.
/SEND (username) — send message to current user.
/SQUELCH (username) — ignore messages from a user.*
/TALK — like /JOIN, but doesn't leave current group. /# also works, where # is the number of a conference group. Allows you to participate in more than one group at the same time.
/WHO — lists all current users and Conference groups.
/WHOIS (username) — displays (username) Profile.

*Note: Many of these commands may be preceded by NO. For example, /GAG disables sends, but /NOGAG resumes them.

DELPHI MAIL

Primary Mail Menu (DMAIL)
CATALOG — lists all Mail files you have created.
EXIT — return to Main Menu.
HELP — explanation of Mail commands.
MAIL — send or read mail. Enters Secondary Mail Menu.
SCAN — display the headers for all unread mail.

Secondary Mail Menu (MAIL)
[ENTER] — depressing the return or carriage return key, will read the next message or more of the current message.
BACK — displays previous message.
DELETE — deletes current (last read) message.
DIRECTORY — lists summary of your mail messages.
DIRECTORY /FOLDER — lists folder names.
DIRECTORY (folder name) — lists summary of messages in the specified folder. For instance, DIR Pending.
EXIT — returns to Main Menu.
EXTRACT (filename) — adds current message to named file.
FILE (folder name) — adds current message to the named folder.
FORWARD — forward present message to others.
NEXT — skips to next Mail message. ([ENTER] defaults to NEXT.)
READ — displays your Mail messages.
READ (folder name) — reads contents of named Mail folder.
READ (n) — allows you to read selected message number.
READ /NEW — for new MAIL arriving while in MAIL.
REPLY — sends a reply to sender of current message.
SEARCH (string) — searches current Mail file for specified character string.
SELECT — pick messages for delete operation.
SEND — sends message to another user or users.
SEND (filename) — sends file (filename) to other user(s).
SEND /EDIT — calls editor to edit message being sent.
SEND /LAST — uses last message as text for current message.

HELP

Contains a full description of all Delphi services using the same structure as the Delphi Menus.

PEOPLE ON DELPHI

Enter information about yourself; find out about others.

This section is accessed from the Delphi Main Menu. When someone does a /W command in conference, this is the information that will be displayed about a member.

I-AM — add or change information about yourself.
ADD — adds to existing information.
CHANGE — removes all current information about you and request new info.
DELETE — deletes all information under a given keyword heading.
DISPLAY — prints your personal profile.
EXIT — returns to Main Menu.
WHOIS (membername) — displays member profile if available.
SEARCH — find members with particular interests.
BROWSE — browse through member profiles.
LIST-KEYWORDS — shows keywords used in member profiles.

USING-DELPHI

ADVICE FROM DELPHI — answers to most frequently asked questions.
CREDIT POLICY — explanation of current DELPHI policy.
GUIDED-TOUR — a brief version of the tour you took at signon.
MAIL TO SERVICE — send comments and suggestions to DELPHI.
NETWORK-INFO — phone numbers and login procedures for data networks.
PREMIUM-SERVICES — information concerning the extra cost services.
RATES-AND-PRICES — official Delphi rates and prices.
SETUP — terminal and network configuration.
LENGTH — lets you find your screen length and tailor Delphi accordingly.
MENU — choose default menu at sign-on.
PASSWORD — change your password. (frequent changes are recommended.)
PROMPT — select level of menu prompting desired.
SET-TYMNET — experiment with setting network parameters.
TERMINAL — special features for DEC VT100 and VT52 users.
WIDTH — tailor Delphi to fit your screen width.
USAGE-HISTORY — view your to-date activities on Delphi.

DELPHI TERMINAL CONFIGURATION GUIDE

8 bit ASCII*
1 stop bit*
no parity*
asynchronous
full-duplex
no auto-linefeed or carriage-return linefeed
XON-XOFF or Handshaking should be enabled

*sometimes you have to experiment with other combinations such as: (7 bit, 1 stop, noparity) or (8 bit, 1 stop, even or odd parity).

NOTES

To erase a character, Delphi uses the ASCII delete/rubout key which is decimal 127. If necessary, the terminal program should translate the backspace key to a delete/rubout. Unfortunately the networks do not echo the delete/rubout correctly however it will have the desired effect.

Delphi uses the following control characters:

CONTROL-Z — end of input or exit to next higher menu.
CONTROL-S — suspends sending.
CONTROL-Q — resumes sending.
CONTROL-O — skips to end of file or message.
CONTROL-U — cancels input for current line.
CONTROL-R — redisplays current line.
CONTROL-X — cancels everything typed ahead but unsent.
CONTROL-C — cancel current activity and start over.

If a particular control key is causing the terminal program to take some other action, then the terminal program should be reconfigured to use any of the other available control keys in place of the one required by Delphi.

Modified Command Card for Rainbow Readers

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members, the Database section has been expanded to include a Data Communications topic section. This was neccessary because of the growing number of telecommunications-related files. All of the telecommunications files that were in the Home Applications topic section have now been moved to their new home in the Data Communications section.

This brings up another subject of member needs, *MTERM* (*Mikeyterm*). *MTERM 4.0* is now available in the Data Communications section. This version supercedes all other versions of *MTERM*. This group of files includes the machine language program, the BASIC loaders to POKE the machine language program into memory, the configuration program and the document files. You no longer have to search for the different versions to drive the serial port, the Deluxe RS-232 Pak or the PBJ *Word-Pak*; *Mikeyterm 4.0* supports any combination of these.

This is an excellent terminal program that is free for the downloading and supports XMODEM file transfer protocol. If your current program supports XMODEM, you can download the machine language file and execute it. If your terminal program does not have advanced file transfer capabilities, you may need to use the buffer capture method to download the BASIC loaders and then create the machine language program offline.

Several members have expressed problems about the downloading process. In order to download a file, go to the Database section from the CoCo SIG prompt. This is accomplished by typing DA and pressing ENTER at the prompt. Then choose which topic section you would like to go to. At the topic prompt, you can do a DIR and see a list of all of the files in that topic section. If you see a file that interests you, read the file (READ filename) — this presents you with a description of the file. You are now at the action prompt. If you want to return to the topic prompt, use the EXIT command or CONTROL-Z. If you would like to read the next file or group of files, type NEXT and press ENTER or just press ENTER alone. If, however, you would like to download the file, you have several options.

The best download protocol is XMODEM. This is an eight-bit, error-free checksum file transfer. To do an XMODEM download, type XM and press ENTER at the action prompt. You are then informed when to initiate XMODEM receive on your terminal program. Your terminal program must specifically support XMODEM in order to use this function. This type of transfer ensures that the program does not have any dropped characters or erroneous characters when downloaded.

Also, there is the DOWNLOAD option. This can be used with the buffer capture method of downloading. When this function is invoked, you are prompted to press ENTER to begin. This allows you to open your buffer. Once the file has been displayed, close the buffer and dump it to either disk or cassette. You may have to use a word processor to remove any extra characters from the file so the program can be run.

> ***"We encourage regular uploads to be in ASCII format to enable buffer capture of the files. This allows all of our members to access them."***

There are also the LIST and DISPLAY commands. These are unformatted listings of the file. When using these options, you definitely have to use a word processor to clean up the file. This is the least desirable type of file transfer.

RAINBOW ON TAPE programs have been uploaded in binary form to promote the use of XMODEM downloading of the files. The reason for this is to make certain you receive an error-free download of the file. Remember that there is a surcharge applied to these programs. Therefore, it is in your best interest to use XMODEM transfer. If your terminal program does not support XMODEM, then you may want to download *MTERM* to use when downloading.

We encourage regular uploads to be in ASCII format to enable buffer capture of the files. This allows all of our members to access them. An error is easily dealt with by downloading the program again, and doesn't add any surcharge to your Delphi account.

We also encourage members to upload public domain programs to be included in our database for other members to share. We wish to thank the following people for taking the time to upload files to our database this month:

Rodger Alexander (SALZARD), ***Diet:*** This program keeps a daily account of calorie input by food description and daily weight records. A monthly weight chart is available to keep track of your progress.

Devin Cook (ELECTROMAGIC), ***MASTER/TRM:*** A terminal program for use with the Deluxe RS-232 Pak. It supports 300/1200 Baud and has a 40-column Hi-Res screen.

Marty Goodman (MARTYGOODMAN), ***"Complete Newbox Series":*** The up-to-date compilation of Marty's thoughts on how the CoCo should have been handled by Tandy.

Bill K. Haesslein (BILLH), ***Disk Utility:*** A utility program that makes life with your disk drives easier.

Stephane Venne (SVENNE), ***STRE KSV/BAS:*** A graphics picture made using *CoCo Max* — the "NCC 1701 Enterprise."

Douglass Trites (RUGBY), ***Xmastags:*** This program generates Christmas tags on a CGP-115 Color printer. The instructions are embedded in the program using REMark statements.

Look forward to better things on Delphi and more conferences with "Who's Who of the CoCo World" in the near future on the CoCo SIG. Also, we plan to initiate an interesting contest very soon. Delphi has promised to take care of several things that you, our members, have complained about.

If you have any questions or suggestions you would like to be addressed, either leave me a message on the CoCo SIG under username RAINBOWMAG, or write to me in care of THE RAINBOW.

Until next month, meet me and the rest of THE RAINBOW staff on Delphi's CoCo SIG and share in the wealth the Color Computer Community has to offer.

"The CBASIC Compiler"

Now anyone can create fast efficient Machine Language Programs Easily and Quickly without having to use an Editor/Assembler

CBASIC is a fully integrated, easy to use Basic program Editor and Compiler package. CBASIC is 99% syntax compatible with Disk Extended Color Basic programs, so most Basic programs can be loaded and compiled by CBASIC with little or no changes required. The compiler is an optomizing two-pass integer Basic compiler that can convert programs written in Disk Extended Color Basic into 100% pure 6809 Machine Language programs which are written directly to disk in a LOADM compatible format.

The programs generated by the compiler can be run as complete stand alone programs. A built-in linker/editor will automatically select one and only one copy of each subroutine that is required from the internal run-time library and insert them directly in the program. This eliminates the need for cumbersome, often wasteful separate "run-time" packages.

CBASIC WAS DESIGNED FOR BOTH BEGINNING & ADVANCED USERS

CBASIC is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. The Beginner or Novice programmer can write and compile programs without having to worry about Stack Pointers, DP registers, memory allocation, and so on, because CBASIC will handle it for you automatically. All they have to do is write their programs using the standard Basic statements and syntax. For the advanced Basic and Machine Language programmers, CBASIC will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines or functions.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset, and On Error handling. It also has advanced programming features that allow machine level control of the Stack and Direct Page registers, variable allocation, automatic 64K RAM control, program origin and even multiple origins. It can even have machine language code generated within a program that executes just like any other Basic program line.

FULL COMMAND SUPPORT & SPEED

CBASIC features well over 100 Basic Commands and Functions that fully support Disk, Tape, Printer and Screen I/O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, and all with 99.9% syntax compatibility.

CBASIC is FAST. Not only will CBASIC compiled programs execute 10 to 1000 times faster than Basic, but the time it takes to develop a CBASIC program versus writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC in a matter of days or hours, even for a well experienced machine language programmer. We had a report from a CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes". Another user reported a program that took 1 to 1½ hours to run in Basic, now runs in 5 to 6 minutes!!!

MORE THAN JUST A COMPILER

CBASIC has its own completely integrated Basic Program Editor. The Editor contained in CBASIC is used to Create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built-in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving, Appending (merging), Killing disk files and displaying a Disk Directory. It also has automatic line number generation for use when creating programs or inserting sequencial lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "falling off a log". If CBASIC finds an error when compiling, it points to the place in the program line where the error occurred. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple.

HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51, 64 or 85 by 24 line display. It is also the only compiler that supports both the PBJ "Word-Pak" and the Double Density 80 column cards. All of these display formats are part of the standard CBASIC compiler package. Not only can these display formats be used for normal program editing and compiling, but CBASIC will also include them in your compiled programs! If you want CBASIC to include the display driver in your program, all you have to do is use a single CBASIC command "HIRES". The run-time display driver that CBASIC includes in your program is not just a simple display, but a full-featured display package. With the Hi-Resolution display package you can mix text & graphics, change characters per line, underline, character highlight, erase to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more. All commands are compatible with our HI-RES II Screen Commander so you can easily develop screen layouts using HI-RES and Color Basic before you compile your program. The same applies to using the 80 column card drivers. What other Basic compiler offers you this kind of flexibility?

64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 6883 SAM (Synchronous Address Multiplexer) in the Color Computer. It will fully utilize the 96K of address space available in the Color Computer (64K installed) during program Creation, Editing and Compilation. CBASIC has a special command for automatic 64K RAM control. When used in a program, it allows the user to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically switch the ROMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of 64K RAM like CBASIC.

ALL MACHINE LANGUAGE

CBASIC is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers. Because of this, CBASIC can edit and compile very large programs. Even using the Hi-Resolution 51 by 24 line display, it can work with about a 34K program, and the 80 column card versions can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs, CBASIC compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

THE FINISHED PRODUCT

Since CBASIC contains statements to support ALL of the I/O devices (Disk, Tape, Screen & Printer), Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. It generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC doesn't do this. ALL of its commands are compiled into a single machine language program that does not require any kind of Basic program to make it work.

COMPATIBILITY

You may be wondering about those statements we made earlier concerning 99% or 99.9% syntax compatibility. What does that other 1% consist of? The biggest part of that 1% has to do with string arrays and variables. CBASIC does not use a "String Pool" like Color Basic. It uses absolute memory addresses to locate string variables and arrays. This is why CBASIC's string processing is so fast, it also eliminates the time consuming "Garbage Collection" problem. When CBASIC allocates space for strings, it must know how much space to use for each string. When you Dimension a string variable in CBASIC, you must tell it how much space you want to save for each element. To Dimension an array of 40 strings, 64 characters each, you would DIM DA$(40,64). If a string is not dimensioned, CBASIC will automatically allocate 32 bytes for it. If you want a single string to have enough room for 200 characters you would DIM AX$(200). For string arrays, you would still access the element you want, the same as Color Basic, to get string #30 from the array DA$, you would still use DA$(30), the only real change is in the DIM statement. For undeclared string arrays of 10 elements or less, CBASIC will automatically reserve space for 10 (0-9) strings of 32 characters. In some other Color Basic compilers, you have to declare EVERY string variable used in the progrm in a DIM statement. And, to create an array of 40 strings with 64 characters each, you would have to DIM AD$(2560), and then to access string #30, you would have to multiply 30 × 64 and use a special variable name format or access it one character at a time. Not very compatible or convenient to use, and difficult at best.

CBASIC REQUIREMENTS

CBASIC requires a minimum of 32K RAM and at least one Disk drive. We strongly recommend that you have 64K. CBASIC is compatible with all versions of Color & Extended Basic and both Disk Basic V1.0 and V1.1. Programs compiled on either system will run on systems with different ROMs. CBASIC is NOT compatible with JDOS.

DOCUMENTATION

The Documentation provided with any program is very important to the user. This is especially true when you talk about a program as complete and complex as CBASIC. Even though CBASIC was designed to be the most User Friendly compiler on the market, we went to great lengths to provide a manual that is not only easy to use and understand, but comprehensive and complete enough for even the most sophisticated user. The manual included with CBASIC consists of approximately 120 pages of real information, not like some manuals that put just one or two short paragraphs on a page. If we did it that way, we could have easily created a three or four hundred page manual. The manual index breaks down each section of the manual and gives a 3 or 4 word description of each section and its items along with page numbers. The manual has three sections, the Editor, Compiler and Appendix. Each of these is divided into subsections, with Section and Subsection titles printed at the top of each page. If you want to, you could find the information you are looking for by simply flipping through the pages and scanning the Section titles on the top of the pages. The Manual itself is an 8½ by 11 Spiral Bound book with durable leather textured covers. Some of the reports we have had from CBASIC users describe the manual as being the Best program manual they have ever used.

COMPARE THE DIFFERENCE

CBASIC is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer. Compare CBASIC's features to what other compilers offer and you'll see the difference. When comparing CBASIC to other compilers, you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or string statements at all? How large of a program can you write? Can you compile a complex string like: MID$(RIGHT$(DA$(VAL(IN$),LEN(LE$)),3,3)? Can you use two character variable names for string & numeric variables, like Basic. Does it support all the Hi-Res graphics statements including PLAY, DRAW, GET and PUT, using the same syntax as Basic? Do you ever have to use a separate Basic program? Can you take complete Basic programs and compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

PRICE VERSUS PERFORMANCE

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 2 years writing and refining CBASIC, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC users already bought one or more of the other compilers on the market and have since discarded them. We even traded in a few of them. If you want a cheap compiler, we'll sell you one of those traded in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

ORDERING INFORMATION

To order CBASIC by mail, send check or money order in the amount of $149.00 plus $3.00 for shipping and handling to the address listed below.

To order by VISA, MASTERCARD or COD, call us at: (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST).

CER-COMP
5566 Ricochet Ave.
Las Vegas, NV 89110
(702) 452-0632

DISK
$44.95

NEW

Introducing The "Super Smart"

DATA PACK II
TERMINAL COMMUNICATIONS SOFTWARE

NEW

TAPE
$34.95

Also Supports The PBJ 80 Column "Word Pak", Deluxe RS-232 Pak, Parallel Printer Card and PBJ 2SP Pak

28-64x24 Hi-Resolution Display

64K Support Up To 55K Text Buffer

9 Unlimited Variable Length Macro Key Buffers

BUFFER EDITOR Insert, Delete Change or Add To Buffer

"FEATURES"

- No Lost Information When Using Hi-Resolution Display On Line
- ASCII Compatible File Format
- Full Text Buffering
- Terminal Baud Rates 300 to 9600
- Automatic Word Wrap Eliminates Split Words
- Full/Half Duplex
- Automatic File Capture
- Programmable Word Length, Parity and Stop Bits
- Save and Load Text Buffer and Program Key Buffers to Tape or Disk
- 9 Hi-Resolution Display Formats, 28 to 255 x 24
- True Upper/lower Case Display
- Kill Graphics Option for an Extra 6K
- Supports Line Break
- Freeze Display and Review Information On Line
- Send Files Directly from Buffer or Disk
- Full Disk Support for Disk Version
- Send Control Codes from Keyboard
- Separate Printer Baud Rates 110-9600
- Display on Screen or Output Contents of Buffer to Printer
- Automatic Memory Sense 16-64K
- 9 Programmable Function Key Variable Length Macro Buffer
- Programmable Prompt Character or Delay to Send Next Line
- Programmable Control Character Trapping
- Programmable Open/Close Buffer Characters
- Automatic Key Repeat For Editing
- Program and Memory Status Displays

"The Source"
has arrived!

The Source brings the cost of Disassembler and Assembler Source code generation down to Earth.

Now you can Disassemble Color Computer machine language programs and generate beautiful, Assembler Source Code for a fraction of the cost of other Disassembler/Source Generator programs.

The Source has all the features and functions you are looking for in a Disassembler.

- Automatic label generation.
- Allows specifying FCB, FCC and FDB areas.
- Disassembles programs directly from Disk.
- Supports multiple origin disk files.
- Output complete Disassembled listing with labels to the Printer, Screen or both.
- Generates Assembler compatible source files directly to disk.
- Generated source files are in standard ASCII format that can be edited by most word processors.
- Built in Hex/Ascii dump/display to help locate FCB, FCC and FDB areas in a program.
- Fast Disassembly mode for testing & checking FCB, FCC and FDB mapped areas.
- Built in Disk Directory and Kill file commands.
- Menu display with single key commands for smooth, Easy, almost foolproof operation.

32K Disk $34.95

Starship Falcon
Graphics Adventure Game

Six months ago a terrorist group demanded to be designated the rulers of Alpha Sigma III, under the threat of world starvation on the planet Earth. The Federation denied their demands, so they released a biological weapon which has destroyed all known edible plant species from throughout the known galaxy. To date no plant life has been able to survive on Earth. Recently, Federation undercover agents have reported a story told by a roving space trader, of a planet with abundant edible plant life. These plants have a reputation of being able to survive in all climates and in fact, are supposed to grow at an incredible rate. The Federation is desperate! If Earth's food source is not replaced soon, the Federation will have to evacuate all animal and Human life. Your mission is to go to the planet Zephyr and obtain the seed of these plants and return to Earth. Several Federation agents have been sent to obtain the seeds and none has returned! Can you get the seed and survive??? GOOD LUCK!

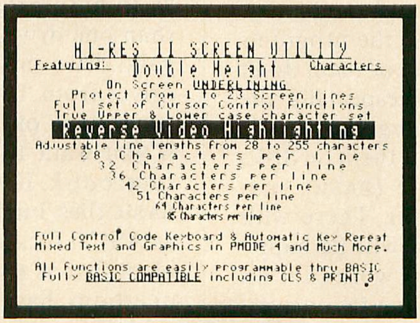
32K Disk $21.95

HI — RES II SCREEN UTILITY

NEW IMPROVED VERSION

- *UP TO 85 CHARACTERS PER LINE READABILITY*
- *ADJUSTABLE AUTOMATIC KEY REPEAT*
- *PROPTECT 1-23 SCREEN LINES*
- *CONTROL CODE KEYBOARD*

- FULLY BASIC COMPATIBLE
- DISPLAY FORMATS OF 28 to 255 CHARACTERS PER LINE
- FULL 96 UPPER/LOWER CASE CHARACTERS
- MIXED GRAPHICS & TEXT OR SEPARATE GRAPHIC & TEXT SCREENS
- INDIVIDUAL CHARACTER HIGHLIGHTING
- REVERSE CHARACTER HIGHLIGHT MODE
- WRITTEN IN FAST MACHINE LANGUAGE
- AUTOMATIC RELOCATES TO TOP OF 16/32K
- AUTOMATICALLY SUPPORTS 64K of RAM WITH RESET CONTROL
- REVERSE SCREEN
- ON SCREEN UNDERLINE
- DOUBLE SIZE CHARACTERS
- ERASE TO END OF LINE
- ERASE TO END OF SCREEN
- HOME CURSOR
- BELL TONE CHARACTER
- HOME CURSOR & CLEAR SCREEN
- REQUIRES ONLY 2K OF RAM
- COMPATIBLE WITH ALL TAPE & DISK SYSTEMS



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HI-RES II SCREEN UTILITY
Featuring:   Double Height   Characters
On Screen UNDERLINING
Protect From 1 to 23 Screen lines
Full set of Cursor Control Functions
True Upper & Lower case character set
Reverse Video Highlighting
Adjustable line lengths from 28 to 255 characters
28 Characters per line
32 Characters per line
36 Characters per line
42 Characters per line
51 Characters per line
64 Characters per line
85 Characters per line

Full Control Code Keyboard & Automatic Key Repeat
Mixed Text and Graphics in PMODE 4 and Much More.

All Functions are easily programmable thru BASIC
Fully BASIC COMPATIBLE including CLS & PRINT @
```

$24^{95} TAPE $29^{95} DISK

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Screen Enhancement Program Comparison Chart

PROGRAM FEATURES	HI-RES II NEW	HI-RES I OLD	BRAND X
Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Black	Buff/Black	Buff/Black
X.Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L keys	Clear key	No
16.32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program	Yes	Yes	Yes
RAM Required in addition to Screen RAM	2K	2K	2K
Program Price (Tape)	$24.95	$19.95	$29.95

VISA

master charge
THE INTERBANK CARD

VISA, MASTERCARD AND C.O.D. ACCEPTED

File Search allows you to store files on disk sorted by program type

Gathering Up Scattered Programs

By Pete Eichstaedt

When I found I had several disks with only a few programs on each, I wrote *File Search*, a disk file "search and copy" utility. It seemed that every time I had a new idea for a program, I used a new disk. Although I still use the programs on the varied disks, most of them don't require their own disk, especially the machine language programs. *File Search* allowed me to put them on disks sorted by program type (BASIC, machine language and data). Those with 16K and only one drive will be happy to know that the program works fine on your machine. If you have two drives, the program will work faster because you don't have to keep swapping disks.

Here's how the program works: On startup, the program asks which is the source drive and which is the destination. If you only have one drive, answer '0' to both prompts. If you have more than one drive, you can use any single valid drive in your system, or any two drives from '0' to '3'. Next, CoCo asks which type of file you want to copy or if you want to copy all files from the source disk. If you want to copy all your BASIC files, but have some of them saved as ASCII files, don't worry. They're still identified as BASIC programs. Once the questions have been answered, CoCo takes off and does the rest. The only interaction required is if only one drive is being used and a disk swap is required.

As the program runs, it reads the source disk directory, then checks the target disk directory to see if the program is there already. This saves the dreaded AE Errors common in copying. A message is displayed to show which file is being checked. You might see a

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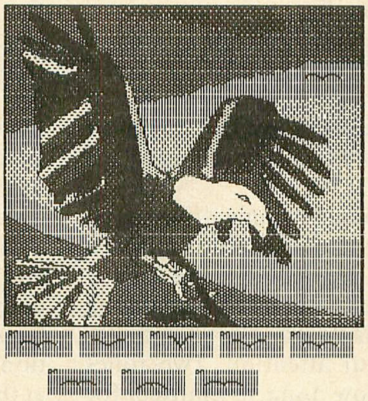
(Pete Eichstaedt lives in Downers Grove, Illinois, and is a field service engineer for Digital Transmission, Inc., a manufacturer of telecommunications systems. He has been using his Color Computer for work and play for the last five years. This is his second program published in THE RAINBOW.*)*

MORETON BAY SOFTWARE

MORE GOOD SOFTWARE

GRAPHICOM 3 disk package 64K EXB disk	$29.95
SAM DIAMOND graphic adventure 32K EXB disk	$29.95
HOT SLOT casino simulation 32K EXB disk or tape	$24.95
ECLIPSE excellent pixel editor 64K EXB disk	$19.95



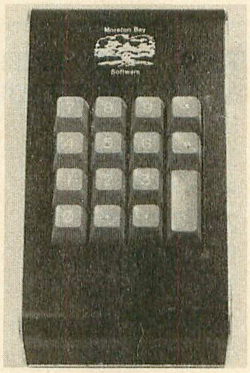
THE MOTION PICTURE

A complete animation development system for your CoCo! An object oriented graphic screen developer. Using this tool you can quickly and simply animate your pictures. Take standard graphic screens that you develop and incorporate them into MOTION PICTURES. Animate up to eight frames, yielding smooth animation. Generate screens from objects and build screens from stored object files. Included are routines to display animation from BASIC. We believe you'll like this program, so we make this offer: We will send you a demonstration disk for $4.00 which you can apply as a credit if you buy the program. Requires 64K. Disk, $39.95.

MORE KEYS

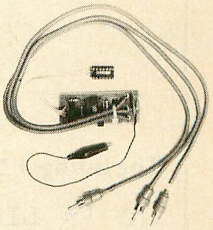
At last a quality numeric keypad for your Color Computer. This 15 key numeric pad plugs inside your computer and gives you the convenience of rapid numeric data entry. Dimensions: length 6½" (165mm), width 4" (101 mm), height 3" (76 mm). Baked black enamel finish. Specify computer model. MORE KEYS complete with cable and connector.

$69.95



DOUBLE DRIVER I

The BEST monitor driver available. Color composite, monochrome and audio output. For original CoCo D, E and F boards. $24.95.



MONO II

Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

$24.95.

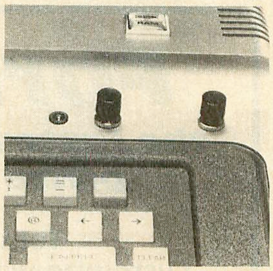
RESET-POWER-SWITCHES

A REAL IMPROVEMENT

Move the power switch and reset switch where they belong. An LED power on light too! High quality parts, D and E boards totally solderless. The F board and some models of the CoCo II require soldering.

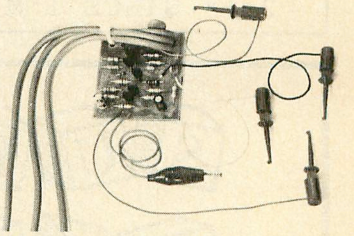
Reset 1 Coco 1 $24.95
Reset 2 CoCo 2 $27.95

Either kit add $2.00 shipping and handling.

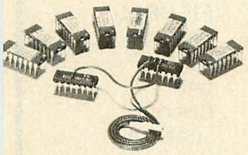


DOUBLE DRIVER II

Finally a monitor driver for the Color Computer II that lets you use a monochrome and a color monitor simultaneously. We're proud of this new driver. The six transister circuit provides optimal signal mixing and signal gain. Excellent monochrome output and better quality resolution in the color ouput than any driver we have seen. Audio output also. Fits all models of the Color Computer II. $29.95.



64K UPGRADES



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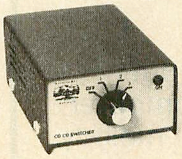

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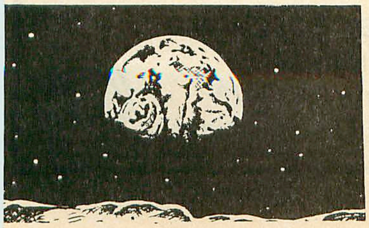

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comparison check being made on a file that doesn't look right. This is probably from a killed file, but don't worry — if the file isn't there, it can't be copied. If a file of the same name and format exists on both disks, it won't be copied, either. A message is displayed when a file is transferred.

When the copy is complete, CoCo asks if you want to transfer files from yet another disk. This keeps up as long as you answer "yes" and as long as the disk has room. If you run out of room while a copy is in progress, the program crashes with a DF Error — Disk Full. This is an acceptable concession when compared to having to type each `COPY` command manually.

When all the files are copied, answer "no" to the "search another disk" prompt. When you key in 'N', CoCo performs a cold start, just like on power up. If you just want to stop, change Line 1800 to `CLOSE:END`.

Of special note to single drive users: The program changes your selected single drive to the default drive for the system. As well, when disk changing prompts are displayed, a tone is generated to get your attention. Two tones are used: A low tone is emitted for required disk changes in the program proper; a higher tone is emitted when the BASIC system's `COPY` command is executed. If you don't change disks in the order requested, you get either an NE Error from the target disk not having the source program, or an AE Error from the source disk in the drive when CoCo is looking for the target disk.

If you don't get RAINBOW ON TAPE and have to type the program in manually, you can leave out all `REMark` ('*) lines and lines 10 through 80. Suggestions and questions can be sent to me at the address at the start of the program listing. ☐

200	255
800	114
1390	130
2090	253
2600	15
END	42

The listing: `FILESRCH`

```
0 '* LINES 0 THROUGH 90 AND ALL
REMARKS LINES CAN BE DELETED WIT
HOUT
1 '* AFFECTING PROGRAM OPERATION
2 '* SINCE I'M PROUD OF THE PROG
RAM, I'D RATHER YOU LEFT LINES
3 '* 10 THROUGH 80 ALONE.
5 CLS
10 PRINT "      ******************
******"
20 PRINT "      * FILESRCH - DISK
FILE *"
30 PRINT "      * COPY ROUTINE FOR
 THE *"
40 PRINT "      * COLOR COMPUTER W
/16K *"
50 PRINT "      * BY PETE EICHSTAE
```

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```
DT    *"
60 PRINT "     * APT D-308
     *"
65 PRINT "   * 2045 PRENTISS DR
IVE  *"
70 PRINT "     * DOWNERS GROVE, I
L     *"
75 PRINT "     *          605
16    *"
80 PRINT "     ******************
******"
90 '* CLEAR AND ALLOCATE STRING
SPACE
95 GOTO 3600
100 CLEAR 1000:DIM PG$(72):DIM P
P$(72)
200 INPUT "WHICH IS INPUT DRIVE"
;ID$:ID = VAL(ID$):IF ID <0 OR I
D > 3 GOTO 2500
300 INPUT "WHICH IS OUTPUT DRIVE
";OD$:OD = VAL(OD$):IF OD <0 OR
OD > 3 GOTO 2500
500 PRINT "WHICH FILE TYPE SOULD
 BE SOUGHT":PRINT "  0 = BASIC P
ROGRAM":PRINT "  1 = BASIC DATA
FILE":PRINT "  2 = MACHINE LANGU
AGE PROGRAM":PRINT "  3 = TEXT E
DITOR SOURCE FILE"
```

```
510 LINE INPUT "  4 = ALL ";FT$:
:IF FT$ <"0" OR FT$ >"4" GOTO 50
0
520 FT = VAL(FT$)
550 IF ID <> OD THEN SOUND 50,3:
PRINT "PUT SOURCE DISK IN DRIVE"
;ID:INPUT "AND PRESS <ENTER>";Z$
590 '* EACH DISK HAS 9 SECTORS F
OR RECORD ENTRIES
600 FOR S = 3 TO 11
690 '* CLEAR THE PROGRAM RECORD
COUNTER
700 PG = 0:IF ID = OD THEN CLS:S
OUND 50,3:PRINT "PUT SOURCE DISK
 IN DRIVE";ID:LINE INPUT "AND PR
ESS 'ENTER'";Z$
790 '* READ THE DIRECTORY SECTOR
S
800 DSKI$ ID, 17, S, DR$(1),DR$(
2)
890 '* IDENTIFY THE STRING TO MA
NIPULATE
900 FOR H = 1 TO 2
990 '* EACH RECORD HAS 32 BYTES
1000 FOR EN = 1 TO 128 STEP 32
1090 '* INCREMENT THE COUNTER
1100 PG = PG+1
1190 '* WE ONLY NEED THE FIRST 1
```

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```
2 BYTES OF EACH RECORD
1195 '* BYTES 1-8 HAVE THE NAME,
 9-11 THE EXTENSION, AND 12 HAS
THE FILE TYPE
1200 PG$(PG) = MID$(DR$(H),EN,12
)
1210 '* IF THE FIRST BYTE IS $0
THE RECORD WAS KILLED, GET THE N
EXT RECORD
1250 '* IF THE FIRST BYTE IS $FF
 THERE ARE NO MORE ENTRIES (UNLE
SS YOU HAVE SOME WEIRD PROGRAM N
AMES)
1260 IF LEFT$(PG$(PG),1) = CHR$(
255) GOTO 1500
1290 '* CHECK THE FILE TYPE.  IF
 IT MATCHES, PROCEED, ELSE GET N
EXT RECORD
1300 IF RIGHT$(PG$(PG),1) = CHR$
(FT) THEN GOSUB 1900 ELSE IF FT=
4 GOSUB 1900
1390 '* GET NEXT ENTRY, CURRENT
STRING, SECTOR
1400 NEXT EN, H, S
1490 '* TRY AGAIN?
1500 CLS
1600 INPUT "SEARCH ANOTHER DISK"
;YN$
1700 IF LEFT$(YN$,1) = "Y" OR LE
FT$(YN$,1) = "y" THEN CLS:GOTO 2
00
1790 '* CLOSE OPENED FILES AND P
ERFORM A COLD START.  REPLACE WI
TH "CLOSE:END" TO STOP COLD STAR
T
1800 CLOSE:POKE 113,0:EXEC &HA02
7
1890 '* PUT A "." BETWEEN THE NA
ME AND EXTENSION (SAME AS A "/")
1900 OP$ = LEFT$(PG$(PG),8)+"."+
MID$(PG$(PG),9,3)
1910 IF G<=1 THEN GOTO 2600 ELSE
 GOTO 2630
1990 '* IF YOU'RE ONLY USEING ON
E DRIVE, MAKE SURE IT'S THE DEFA
ULT DRIVE
2000 IF ID = OD THEN DRIVE ID
2030 PRINT:PRINT "COPYING ";OP$;
" TO DRIVE";OD
2050 IF LEFT$(PG$(PG),1) = CHR$(
0) GOTO 2300
2090 '* IF YOU'RE USING TWO DRIV
ES, COPY FROM THE INPUT DRIVE AN
D TO THE OUTPUT DRIVE
2100 IF ID <> OD THEN COPY OP$+"
:"+RIGHT$(ID$,1) TO OP$+":"+RIGH
T$(OD$,1) ELSE COPY OP$
2190 '* IF YOU'RE USING ONLY ONE
 DRIVE, PROMPT DISK SWITCH
2200 IF ID = OD AND PG <= 1 THEN
 CLS:PRINT "INSERT SOURCE DISKET
TE AND       PRESS 'ENTER'";:SOUN
D50,3:LINE INPUT NX$
2290 '* GET THE NEXT RECORD
2300 RETURN
2400 END
2490 '* IF YOU MESS UP, COCO TEL
LS YOU AND RESTARTS
2500 CLS 4:SOUND 100,1:SOUND 150
,1:SOUND 100,1:PRINT @ 232, "INV
ALID DRIVE!";:FOR X = 1 TO 1000:
NEXT:CLS:GOTO 200
2550 '* SHORTSTOP OVERFLOW INTO
THE NEXT ROUTINE
2560 '* IF IT GETS HERE IT DOESN
'T BELONG ... END!
2590 END
2595 '* CHECK FOR SINGLE DRIVE O
PERATION
2600 IF ID = OD THEN CLS:SOUND 5
0,1:PRINT "INSERT DESTINATION DI
SKETTE IN  DRIVE";OD;:LINE INPUT
"AND PRESS 'ENTER'";Z$
2620 '* SEE IF FILE ALREADY EXIS
TS
2630 PRINT:PRINT "CHECKING DESTI
NATION DISKETTE":PRINT "FOR ";OP
$:PRINT "TO PREVENT <AE ERROR>"
2650 PP=0: FOR SS = 3 TO 11
2700 DSKI$ OD,17,SS,CK$(1),CK$(2
)
2800 FOR HH = 1 TO 2
2900 FOR EE = 1 TO 128 STEP 32
3000 PP = PP +1
3100 PP$(PP) = MID$(CK$(HH),EE,1
2)
3200 IF PP$(PP) = PG$(PG) THEN R
ETURN
3225 IF LEFT$(PP$(PP),1) = CHR$(
255) GOTO 3350
3250 PP$(PP) = ""
3300 NEXT EE,HH,SS
3330 '* IF YOU GET THIS FAR, THE
 FILE MUST BE COPIED
3340 '* CHECK FOR SINGLE DISK OP
ERATION, THEN CALL THE COPY ROUT
INE
3350 IF ID = OD THEN CLS:SOUND 5
0,1:PRINT "INSERT SOURCE DISK IN
 DRIVE";ID:LINE INPUT "AND PRESS
 'ENTER'";Z$
3400 GOTO 2000
3450 '* SHORTSTOP RUNAWAY OPERAT
ION
3500 END
3550 '* CLEAR AS MUCH MEMORY AS
YOU CAN THROUGH BASIC
3600 PCLEAR 1:GOTO 100
```

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CoBBS:

How to Modify the Program to Use the CoCo 'Serial Port'

By Richard Duncan

Written for use with the RS-232 Pak, *CoBBS* takes advantage of it being a true serial port. The "serial port" on the back of the CoCo was designed as a printer port, but through the miracle of software can be used as a communications port (but still not a true RS-232 port, just voltage compatible). *CoBBS* can be modified to use the serial port, but it loses a lot of its features, including advanced key input, no pausing or stopping while a message or file is being displayed, no uploads, no 1200 Baud, slower operation and awkward termination of a call.

If I sound pessimistic about serial operation using the serial printer port, I am! We will discuss briefly some of the modifications required to convert *CoBBS* and its operation. You will have to do the installation depending on your needs. I strongly suggest obtaining an RS-232 Pak if you are serious about running this BBS software, but for those who want to experiment . . . here we go.

Changing *CoBBS* over to the serial port requires modification of the serial driver and all the BASIC routines. The main difference is that the serial version pauses anytime it is polled and waits for a character, where the Pak returns a `CHR$(0)` and returns to BASIC. Throughout the programs, the system jumps to the single key input routine of the driver to strip any extra character waiting to be received, making sure no extraneous character is in the buffer.

The following lines of *USER/SYS* have the statement `EXEC4314`, or `EXEC&H10DA`, in them and should be removed: 40, 68, 70, 150, 180, D266, 345, D1205, 1225 and D7035. If there is a 'D' preceding the number, delete the whole line and replace it with a `REM` statement. The following lines in *COBBS/SYS* to change are: 410, 440, 960, D975, 1005, 1270, 1345, 1420, 1465, 2085, 2410, D7050 and 7057.

The carrier detect routine must also be changed. The way to do this is to check the CD flag set via the serial port. The port should first be reset by the command `K=PEEK(&HFF20)`. Then, by monitoring the location of $FF21 for a change in state, you will know when a carrier is coming in. The command `CD=PEEK(&HFF21)` checks the flag. If the value of 'K' is greater than 100, the system has detected a carrier. After detecting a carrier, again issue the command `K=PEEK(&HFF20)`. From this point on the value of 'K' should be less than 100. If not, it means the last user has dropped his carrier, this is a new caller and the system needs to be rebooted. The carrier detect subroutine for *USER/SYS* should read: `9700 '-CD CHECK-9705 IFPEEK(&HFF21)=`

(Richard Duncan is a broadcast technician for WMC-TV in Memphis, Tennessee. He is active in amateur radio [WD5B] and especially interested in Packet communications. Richard lives in West Memphis, Arkansas.)

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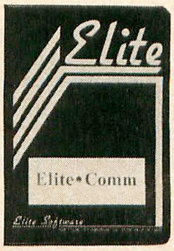

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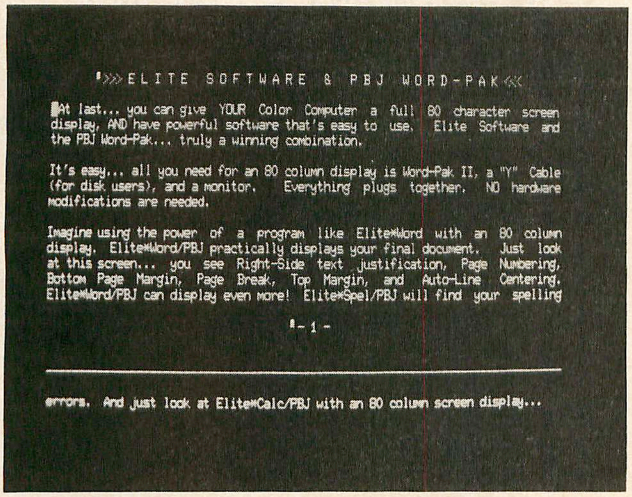

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Elite*Word/PBJ can display even more!  Elite*Spel/PBJ will find your spelling

                                - 1 -

______________________________________________________________________________

errors.  And just look at Elite*Calc/PBJ with an 80 column screen display...
```

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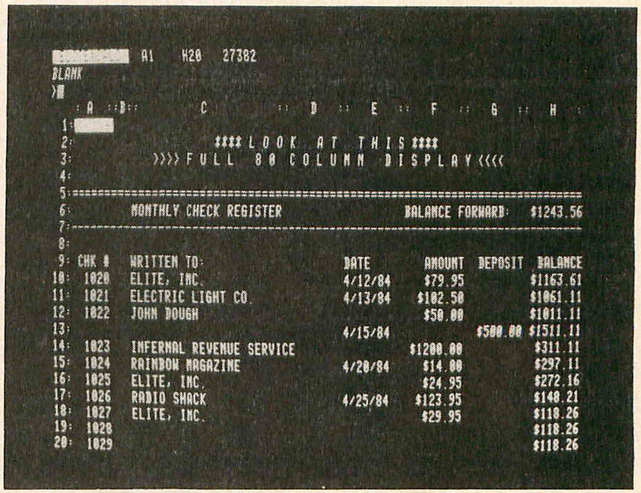

```
            A1   H20   27382
BLANK
>
  : A :: B ::        C          :: D :: E :: F :: G :: H :
 1:
 2:                   #### L O O K   A T   T H I S ####
 3:            >>>> F U L L   8 0   C O L U M N   D I S P L A Y <<<<
 4:
 5:==========================================================================
 6:        MONTHLY CHECK REGISTER                        BALANCE FORWARD:   $1243.56
 7:--------------------------------------------------------------------------
 8:
 9: CHK #   WRITTEN TO:                   DATE      AMOUNT  DEPOSIT  BALANCE
10:  1020   ELITE, INC.                  4/12/84    $79.95           $1163.61
11:  1021   ELECTRIC LIGHT CO.           4/13/84   $102.50           $1061.11
12:  1022   JOHN DOUGH                               $50.00           $1011.11
13:                                      4/15/84            $500.00  $1511.11
14:  1023   INFERNAL REVENUE SERVICE              $1200.00            $311.11
15:  1024   RAINBOW MAGAZINE             4/20/84    $14.00            $297.11
16:  1025   ELITE, INC.                             $24.95            $272.16
17:  1026   RADIO SHACK                  4/25/84   $123.95            $148.21
18:  1027   ELITE, INC.                             $29.95            $118.26
19:  1028                                                             $118.26
20:  1029                                                             $118.26
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```
480 L=JOYSTK(1)
490 PUT(U,R)-(U+20,R+20),M2,PSET
500 IF K>31 THEN U=U+4
510 IF K<31 THEN U=U-4
520 IF L>31 THEN R=R+4
530 IF L<31 THEN R=R-4
540 PK=PEEK(65280)
550 IF PK=126 OR PK=254 THEN GOS
UB 590
560 XG$=INKEY$
570 IF XG$="X" THEN GOSUB 980
580 GOTO 390
590 IF K>31 THEN GOSUB 710
600 IF K<31 THEN GOSUB 790
610 RETURN
620 G=RND(255)
630 P=RND(191)
640 IF G>U-21 AND G<U+42 AND P>R
-21 AND P<R+42 THEN 700
650 CIRCLE(G,P),HG,8
660 PAINT(G,P),8
670 NN=NN+1
680 IF NN=10 THEN HG=HG+5: NN=0:
 JK=JK+1: IF JK=2 THEN PG=PG-1
690 IF PG<1 THEN PG=1
700 RETURN
710 M=U+22
720 N=R+9
730 IF M>253 THEN RETURN ELSE PS
ET(M,N,3)
740 S=RND(PG+20)
750 IF S=1 THEN GOSUB 620
760 V=PPOINT(M+2,N)
770 IF V<>5 AND V<>7 THEN 930 EL
SE PRESET(M,N): M=M+5: GOTO 730
780 RETURN
790 M=U-1
800 N=R+10
810 IF M<2 THEN RETURN ELSE PSET
(M,N,3)
820 S=RND(PG+20)
830 IF S=1 THEN GOSUB 620
840 V=PPOINT(M-2,N)
850 IF V<>5 AND V<>7 THEN 930 EL
SE PRESET(M,N): M=M-5: GOTO 810
860 RETURN
870 FOR T=1 TO 15
880 PUT(U,R)-(U+20,R+20),M1,NOT
890 PLAY PL$
900 NEXT T
910 XX=1
920 GOTO 980
930 IF V=6 THEN 950
940 IF V=8 THEN CIRCLE(M,N),25,5
: PAINT(M,N),5,5: PLAY PL$: SC=S
C+(HG*10)
950 IF V=6 THEN PRESET(M,N)
960 CIRCLE(128,96),255,6
970 RETURN
980 IF XX=1 THEN POKE 65494,0: P
RINT @ 331,"F I N A L";
990 PRINT @ 235,"BUBBLE WAR";
1000 PRINT @ 363,"S C O R E";
1010 PRINT @ 394,SC;
1020 IF XX=1 THEN YU=YU+1: PLAY
PL$
1030 IF XX=1 AND YU<40 THEN 1020
 ELSE IF YU=40 THEN END
1040 PRINT @ 448,"TAP A KEY TO R
ETURN TO GAME";
1050 XX$=INKEY$
1060 IF XX$<>"" THEN CLS: SCREEN
 1,1: RETURN ELSE 1050
1070 END
1080 FOR BN=0 TO 150 STEP 3
1090 CIRCLE(129,96),BN,1+RND(3),
1
1100 IF BN<20 THEN PLAY "T128;CD
EFGAB"
1110 NEXT BN
1120 PCLS1
1130 CIRCLE(128,96),255,6
1140 RETURN
1150 END
1160 REM * END OF LISTING
```

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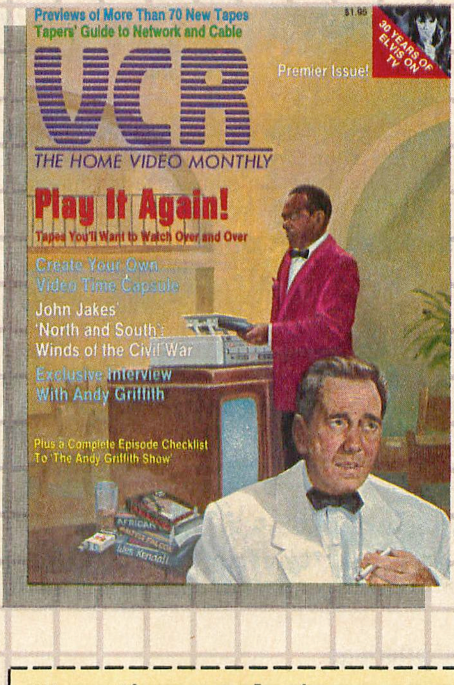
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RAM TEST **16K**

". . . a confidence check for the RAM-SAM portion of your Color Computer."

What's the Diagnosis?

By Craig V. Bobbitt

An assembly language memory checker for the Color Computer, *Memory Diagnostic* has two modes:

1) Short — Every byte is tested to see that each of its bits can be cleared and set (compared to correct values in Register A), then the bytes adjacent to the target byte, which contain the complement of the target, are tested to make sure they don't follow the target (a common memory chip problem).

2) Long — All bit combinations are written into each memory location and checked against Register A.

The program is relocatable and jumps over itself during execution. It is heavily commented and should be fairly easy to follow. It has only been tested on a 64K machine, but it should work in any system configuration of the CoCo.

Lines 45-75	display the title and request memory size.
Lines 78-84	move BASIC to RAM if 64K is selected.
Lines 86-95	request long or short diagnostic.
Lines 96-157	are the body of the short option.
Lines 159-177	are the body of the long option.
Lines 179-END	display error messages.

The listing details how to force an error to see how that part of the program works. *Memory Diagnostic* is intended as a confidence check for the RAM-SAM portion of the Color Computer.

(If you have any questions regarding this program you may contact the author at P.O. Box 584, Greenville, TX 75401, phone 214-457-4476. Please include an SASE when writing.) ☐

(Craig Bobbitt lives in Greenville, Texas, and works on computer and peripheral hardware as a test engineer.)

The listing: MEMDIAG

```
0001        NAM    MEMDIAG 2.2
0002        OPT    NOG
0003 *MEMORY DIAGNOSTIC FOR 64K TRS80 COLOR COMPUTER
0004 *20 APRIL 84
0005 *(C) BY CRAIG V. BOBBITT
0006 *P.O BOX 584
0007 *GREENVILLE,TX 75401
0008 *****************************************************
0009 *                                                   *
0010 *   THIS PROGRAM RUNS A MEMORY TEST ON ALL          *
0011 *   LOCATIONS IN THE COLOR COMPUTER FROM            *
0012 *   0000 TO END OF MEMORY.  ANY DATA                *
0013 *   ERRORS ARE REPORTED TO                          *
0014 *   THE SCREEN AND THE OPERATOR HAS THE OPTION      *
0015 *   OF ENDING THE TEST OR CONTINUING WITH           *
0016 *   THE NEXT LOCATION.                              *
0017 *   THE SHORT TEST PUTS A PATTERN OF ALL ONES       *
0018 *   AND ALL ZEROS IN EACH LOCATION COMPARING        *
```

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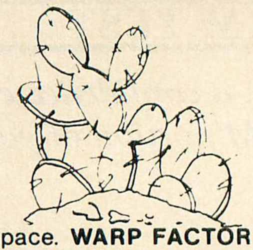

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This program combines all the things you look for in a great two disk graphics adventure program. The Hi-Res graphics are superbly done. The text portion of the screen and the graphics change quickly as you move through the **HALL OF THE KING.** You can move freely from one portion of the adventure to another. Call up your inventory at any time. You can even save or load a game at ANY time. **HALL OF THE KING** will challenge even the most seasoned adventurer.

In an age long past, a dwarven race lived in their mountain home. They were forced to flee under threat of destruction leaving behind their most powerful possession, the Earthstone. As a prominent adventurer, you will be asked to undertake a perilous quest, the recovery of the Earthstone! This is your FIRST adventure in the search for what is deemed to have been the cornerstone of the legendary power of the dwarves.

HALL OF THE KING requires 64K EB and one disk drive. This exciting two disk adventure comes packaged in a vinyl library case. **$39.95**

WARP FACTOR X

If you have been waiting for a game for your color computer that has everything, your wait is over. **WARP FACTOR X** is here. This all graphics simulation game requires strategy, fast thinking, an eye for detail, and above all experience in knowing the capabilities of your starship and its computer. You will begin your adventure into space as a cadet but your ultimate goal is to become Captain of the Enterprise. To do this you must neutralize the enemy planets and eliminate the Klingon starbases along with the Klingons themselves.The Klingon is not a "Robot." He has the same capabilities as your starship but he is also subject to the same problems. You will find that he is inclined to move around while you are attacking him and may even chase you when you find it prudent to retreat. You must form alliances with neutral planets and bring them into the federation. Many of the planets will have special resources which will help the federation.

WARP FACTOR X was written by an engineer for the Kennedy Space Center and has been three years in the making. You will appreciate the attention to detail and complex inner workings of the program. The program is supported by eight pages of documentation important to the success of your mission. Your progress through the eighteen sectors of the galaxy will be recorded and saved for your next adventure into space. **WARP FACTOR X** includes versions for 32K, 64K, and COCO 2. It requires one disk drive and comes packaged in a vinyl library case. **$34.95**

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```
                  0019 *   IT VERIFIES BOTH OF THOSE VALUES.  THE      *
                  0020 *   ADJACENT BYTES CONTAIN COMPLEMENTED DATA    *
                  0021 *   AND THEY ARE CHECKED TO INSURE THEY DON'T   *
                  0022 *   FOLLOW THE TARGET BYTE.                     *
                  0023 *   THE LONG TEST WRITES ALL COMBINATIONS IN    *
                  0024 * EACH  BYTE OF MEMORY VERIFYING THAT THEY ARE *
                  0025 *   READ BACK CORRECTLY.  EXECUTION TIME FOR    *
                  0026 *   THE SHORT TEST IS ABOUT 12 SECONDS, THE     *
                  0027 *   LONG TEST TAKES ABOUT 6 MINUTES             *
                  0028 *   ALL LOCATIONS ARE RESTORED TO THEIR         *
                  0029 *   ORIGINAL VALUES                             *
                  0030 *   THE PROGRAM JUMPS AROUND ITSELF.            *
                  0031 *   TO FORCE AN ERROR, LOAD PROGRAM AT $3000    *
                  0032 *   (DEFAULT) AND EXEC &H3066 SELECT SHORT OPT *
                  0033 *                                               *
                  0034 ************************************************
                  0035
                  0036
                  0037
                  0038 *PROGRAM IS RELOCATABLE
3000              0039        ORG    $3000
A1C1              0040 GETCHR EQU    $A1C1          KEYBOARD INPUT
A002              0041 CHROUT EQU    $A002          SCREEN OUTPUT
                  0042
3000 1A50         0043 START  ORCC   #$50           TURN OFF INTERRUPTS
                  0044
3002 BDA928       0045 .MSIZE JSR    $A928          CLEAR SCREEN
3005 318D0203     0046        LEAY   MSG1,PCR       FIND THE MESSAGE
3009 170141       0047        LBSR   DISPLA         WRITE IT
300C BDA1C1       0048 GETSIZ JSR    GETCHR         LOOK FOR A CHARACTER
300F 27FB         0049        BEQ    GETSIZ         WAIT FOR KEYPRESS
3011 8131         0050        CMPA   #'1            /16K/
3013 2710         0051        BEQ    .16K
3015 8132         0052        CMPA   #'2            /32K/
3017 271C         0053        BEQ    .32K
3019 8133         0054        CMPA   #'3            /64K/
301B 2728         0055        BEQ    .64K
301D 8134         0056        CMPA   #'4            /ABORT/
301F 102702B5     0057        LBEQ   DONE
3023 20E7         0058        BRA    GETSIZE        ILLEGAL OPTION
                  0059
3025 8E3FFF       0060 .16K   LDX    #$3FFF         TOP OF RAM FOR 16K
3028 AF8D02C5     0061        STX    MEMEND,PCR     SAVE IT
302C 8E3136       0062        LDX    #"16
302F AF8D0136     0063        STX    HEADER+23,PCR PUT 16 IN OUTPUT STRING
3033 2031         0064        BRA    WRTHDR         CONTINUE
                  0065
3035 8E7FFF       0066 .32K   LDX    #$7FFF         TOP OF RAM FOR 32K
3038 AF8D02B5     0067        STX    MEMEND,PCR     SAVE IT
303C 8E3332       0068        LDX    #"32
303F AF8D0126     0069        STX    HEADER+23,PCR
3043 2021         0070        BRA    WRTHDR
                  0071
3045 8EFEFF       0072 .64K   LDX    #$FEFF         TOP OF RAM FOR 64K
3048 AF8D02A5     0073        STX    MEMEND,PCR     SAVE IT
304C 8E3634       0074        LDX    #"64
304F AF8D0116     0075        STX    HEADER+23,PCR
                  0076
                  0077 *GO TO 64K MODE
3053 8E8000       0078        LDX    #$8000         START OF ROM
3056 B7FFDE       0079 MOVE   STA    $FFDE          SWITCH PAGE
3059 A680         0080        LDA    ,X+            GET BYTE FROM ROM
305B B7FFDF       0081        STA    $FFDF          SWITCH PAGE BACK
305E A71F         0082        STA    -1,X           STORE IN RAM
3060 AC8D028D     0083        CMPX   MEMEND,PCR     END OF ROM
3064 25F0         0084        BLO    MOVE
                  0085
```

```
3066 BDA928        0086 WRTHDR JSR    $A928         CLEAR SCREEN
3069 318D00E5      0087        LEAY   HEADER,PCR    GET ADX OF HEADER
306D 1700DD        0088        LBSR   DISPLA        WRITE IT
3070 BDA1C1        0089 INPUT  JSR    GETCHR        GO GET A CHARACTER
3073 27FB          0090        BEQ    INPUT         WAIT FOR IT
3075 AD9FA002      0091        JSR    [CHROUT]      ECHO CHARACTER
3079 814C          0092        CMPA   #'L           LONG DIAGNOSTIC?
307B 1027009E      0093        LBEQ   LONG          YES
307F 8153          0094        CMPA   #'S           SHORT?
3081 26E3          0095        BNE    WRTHDR        BAD INPUT RETURN
3083 8EFFFF        0096        LDX    #$FFFF        FIRST LOCATION -1
3086 318DFF76      0097        LEAY   START,PCR
308A 10AF8D0260    0098        STY    TEMP,PCR      SAVE START OF PROGRAM
308F 3001          0099 SLOOP  LEAX   1,X
3091 E684          0100        LDB    ,X            SAVE THE BYTE
3093 E78D025D      0101        STB    TARGET,PCR
3097 E61F          0102        LDB    -1,X          GET LOWER ADJACENT BYTE
3099 E78D0258      0103        STB    LOWER,PCR     STORE IT AWAY
309D E601          0104        LDB    1,X           GET UPPER ADJACENT BYTE
309F E78D0250      0105        STB    UPPER,PCR     STORE IT
30A3 C6FF          0106        LDB    #$FF          COMPLEMENT OF TARGET BYTE
30A5 E71F          0107        STB    -1,X          SET ADJ BYTES TO COMPLEMENT
30A7 E701          0108        STB    1,X
30A9 6F84          0109        CLR    ,X            CLEAR CURRENT LOCATION
30AB 4F            0110        CLRA                 ZERO TO START
30AC A184          0111        CMPA   ,X            ARE THEY EQUAL??
30AE 2703          0112        BEQ    SCONT         YES GO AHEAD
30B0 1701BB        0113        LBSR   ERROR         ERROR IF NOT EQUAL
                   0114 *  DON'T DO ADJACENT BYTES IF AT START
                   0115 *  OR END OF MEMORY
30B3 8C0000        0116 SCONT  CMPX   #0            START OF MEMORY?
30B6 2714          0117        BEQ    SCONT2        YES DON'T DO ADJ BYTES
```

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```
30B8 AC8D0235     0118          CMPX  MEMEND,PCR   END?
30BC 270E         0119          BEQ   SCONT2       YES DON'T CHECK ADJ BYTES
                  0120 *HAVE ADJACENT BYTES CHANGED?
30BE E101         0121          CMPB  1,X          UPPER ADJACENT
30C0 2703         0122          BEQ   SCONT1
30C2 1701A9       0123          LBSR  ERROR        REPORT ERROR
30C5 E11F         0124 SCONT1   CMPB  -1,X         LOWER ADJACENT
30C7 2703         0125          BEQ   SCONT2
30C9 1701A2       0126          LBSR  ERROR
30CC 43           0127 SCONT2   COMA               COMPLEMENT THE GOOD VALUE
30CD 53           0128          COMB               COMPLEMENT ADJ BYTES
30CE 6301         0129          COM   1,X
30D0 631F         0130          COM   -1,X
30D2 6384         0131          COM   ,X
30D4 A184         0132          CMPA  ,X           ALL BITS SET??
30D6 2703         0133          BEQ   SCONT3       YES GO AHEAD
30D8 170193       0134          LBSR  ERROR
30DB 8C0000       0135 SCONT3   CMPX  #0           FIRST LOCATION?
30DE 2714         0136          BEQ   SCONT5
30E0 AC8D020D     0137          CMPX  MEMEND,PCR
30E4 270E         0138          BEQ   SCONT5
30E6 E11F         0139          CMPB  -1,X         B SHOULD = ADJ BYTES
30E8 2703         0140          BEQ   SCONT4
30EA 170181       0141          LBSR  ERROR
30ED E101         0142 SCONT4   CMPB  1,X
30EF 2703         0143          BEQ   SCONT5
30F1 17017A       0144          LBSR  ERROR
                  0145 *RESTORE ALL BYTES
30F4 E68D01FB     0146 SCONT5   LDB   UPPER,PCR
30F8 E701         0147          STB   1,X
30FA E68D01F6     0148          LDB   TARGET,PCR
30FE E784         0149          STB   ,X
3100 E68D01F1     0150          LDB   LOWER,PCR
```

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```
3104 E71F       0151        STB   -1,X
3106 AC8D01E7   0152        CMPX  MEMEND,PCR  HAS ALL MEMORY BEEN TESTED
310A 102701CA   0153        LBEQ  DONE        IF ALL MEMORY TESTED
310E AC8D01DD   0154        CMPX  TEMP,PCR    ARE WE IN THE PROGRAM AREA
3112 1026FF79   0155        LBNE  SLOOP       NO KEEP GOING
3116 308D01DD   0156        LEAX  EXIT,PCR    FIND PROGRAM END
311A 16FF72     0157        LBRA  SLOOP       GO TO IT
                0158
311D 8E0000     0159 LONG   LDX   #0          FIRST LOCATION
                0160
3120 E684       0161 LLOOP  LDB   ,X          SAVE BYTE IN B
3122 6F84       0162        CLR   ,X          CLEAR TARGET BYTE
3124 4F         0163        CLRA              CLEAR COMPARATOR
3125 A184       0164 LCONT  CMPA  ,X          COMPARE
3127 2703       0165        BEQ   LCONT1      IF EQUAL NO ERROR
3129 170142     0166        LBSR  ERROR       REPORT THE ERROR
312C 6C84       0167 LCONT1 INC   ,X          INCREMENT TARGET ADX
312E 4C         0168        INCA              INCREMENT COMPARATOR
312F 8100       0169        CMPA  #0          ALL COMBINATIONS TESTED?
3131 26F2       0170        BNE   LCONT       NO DO IT AGAIN
3133 E780       0171        STB   ,X+         RESTORE BYTE AND POINT TO NEXT ONE
3135 AC8D01B8   0172        CMPX  MEMEND,PCR  ARE WE FINISHED
3139 1027019B   0173        LBEQ  DONE        YES
313D AC8D01AE   0174        CMPX  TEMP,PCR    PROGRAM AREA?
3141 26DD       0175        BNE   LLOOP       DO ANOTHER LOCATION
3143 308D01B0   0176        LEAX  EXIT,PCR    GO  AROUND PROGRAM AREA
3147 20D7       0177        BRA   LLOOP       GO DO IT AGAIN
                0178
3149 AD9FA002   0179 DISP1  JSR   [CHROUT]    SEND A CHAR TO SCREEN
314D A6A0       0180 DISPLA LDA   ,Y+         GET A CHAR
314F 26F8       0181        BNE   DISP1       PRINT IT
3151 39         0182        RTS               RETURN
                0183
                0184 *SCREEN MESSAGES X'S WILL BE FILLED IN WITH
                0185 * CORRECT VALUES IN ERROR ROUTINE
                0186
3152 20         0187 HEADER FCS   /     MEMORY DIAGNOSTIC 64K      <0D>SHORT OR LONG?/
3182 0D         0188 ERMSG  FCS   /<0D>DATA ERROR:<0D>ADDRESS=XXXX<0D>EXPECTED DATA=XX<0D>ACTUAL
 DATA=XX/
31BC 0D         0189 CONTN  FCS   /<0D>WANT TO CONTINUE? (Y OR N)/
31D8 0D         0190 LAST   FCS   /<0D>DIAGNOSTIC COMPLETE<0D><0D>**PRESS ANY KEY TO CONTINUE**/
320C 43         0191 MSG1   FCS   /COLOR COMPUTER MEMORY DIAGNOSTIC<0D>  !ENTER MEMORY SIZE (1-4
)<0D><0D>  1) 16K<0D>  2) 32K<0D>  3) 64K<0D>  4)ABORT/
                0192
326E 3436       0193 ERROR  PSHS  D,X,Y       SAVE REGISTERS
3270 AF8D0078   0194        STX   LOCTN,PCR   SAVE LOCATION
3274 A78D0076   0195        STA   AREG,PCR    SAVE GOOD VALUE
3278 318DFF06   0196        LEAY  ERMSG,PCR   FIND ERROR MSG
327C 31A815     0197        LEAY  21,Y        POINT TO OUTPUT BUFFER
327F 308D0069   0198        LEAX  LOCTN,PCR   CONVERT THE LOCATION TO ASCII
3283 8D2E       0199        BSR   CONVRT
3285 3121       0200        LEAY  1,Y         NEXT OUTPUT LOC
3287 8D2A       0201        BSR   CONVRT      CONVERT IT
3289 31A810     0202        LEAY  16,Y        OUTPUT LOCATION DATA EXPECTED
328C 8D25       0203        BSR   CONVRT      CONVERT IT
328E AE62       0204        LDX   2,S         GET OLD X VALUE
3290 312E       0205        LEAY  14,Y        LOCATION FOR ACTUAL VALUE
3292 8D1F       0206        BSR   CONVRT      CONVERT
3294 318DFEEA   0207        LEAY  ERMSG,PCR   FIND ERROR MSG
3298 17FEB2     0208        LBSR  DISPLA      WRITE IT TO SCREEN
329B 318DFF1D   0209        LEAY  CONTN,PCR   FIND CONTINUE MESSAGE
329F 17FEAB     0210        LBSR  DISPLA      WRITE IT
32A2 176F1C     0211 ANSWER LBSR  GETCHR
32A5 27FB       0212        BEQ   ANSWER      KEEP LOOKING
32A7 AD9FA002   0213        JSR   [CHROUT]    ECHO ANSWER
32AB 8159       0214        CMPA  #'Y         IS IT A YES?
32AD 2702       0215        BEQ   GOBACK      YES GO BACK WHERE YOU CAME FROM
```

```
32AF 2027         0216        BRA   DONE
32B1 35B6         0217 GOBACK PULS  D,X,Y,PC      RETURN
                  0218
32B3 A684         0219 CONVRT LDA   ,X            GET FIRST BYTE
32B5 84F0         0220        ANDA  #$F0          GET LEFT 4 BITS
0004              0221        RPT   4
                  0222        LSRA
                  0223        ENDR
32B7 44              +        LSRA
32B8 44              +        LSRA
32B9 44              +        LSRA
32BA 44              +        LSRA
32BB 8109         0224        CMPA  #9            IS THIS A NUMBER
32BD 2E04         0225        BGT   LETR          NO ITS A LETTER
32BF 8B30         0226        ADDA  #$30
32C1 2002         0227        BRA   CONCNT
32C3 8B37         0228 LETR   ADDA  #$37          CHANGE IT TO ASCII
32C5 A7A0         0229 CONCNT STA   ,Y+           PUT IT IN OUTPUT STRING
32C7 A680         0230        LDA   ,X+           GET IT AGAIN
32C9 840F         0231        ANDA  #$0F          GET RIGHT BITS
32CB 8109         0232        CMPA  #9
32CD 2E04         0233        BGT   LETR1
32CF 8B30         0234        ADDA  #$30
32D1 2002         0235        BRA   CNCNT
32D3 8B37         0236 LETR1  ADDA  #$37
32D5 A7A4         0237 CNCNT  STA   ,Y
32D7 39           0238        RTS
                  0239
32D8 318DFEFC     0240 DONE   LEAY  LAST,PCR
32DC 17FE6E       0241        LBSR  DISPLA
32DF BDA1C1       0242 DONE1  JSR   GETCHR        IS THERE A KEY PRESSED
32E2 27FB         0243        BEQ   DONE1
32E4 1CA0         0244        ANDCC #$A0          RESTORE INTERRUPTS
32E6 B7FFDE       0245        STA   $FFDE         TURN OFF 64K MODE
32E9 7EA027       0246        JMP   $A027         GO TO BASIC RESET ROUTINE
32EC              0247 LOCTN  RMB   2
32EE              0248 AREG   RMB   1
32EF              0249 TEMP   RMB   2
32F1              0250 MEMEND RMB   2
32F3              0251 UPPER  RMB   1
32F4              0252 TARGET RMB   1
32F5              0253 LOWER  RMB   1
32F6              0254        RMB   1
32F7 12           0255 EXIT   NOP
3000              0256        END   START
        NO ERROR(S) DETECTED
```

```
  SYMBOL TABLE:

.16K   3025    .32K   3035    .64K   3045    .MSIZE 3002
ANSWER 32A2    AREG   32EE    CHROUT A002    CNCNT  32D5
CONCNT 32C5    CONTN  31BC    CONVRT 32B3    DISP1  3149
DISPLA 314D    DONE   32D8    DONE1  32DF    ERMSG  3182
ERROR  326E    EXIT   32F7    GETCHR A1C1    GETSIZ 300C
GOBACK 32B1    HEADER 3152    INPUT  3070    LAST   31D8
LCONT  3125    LCONT1 312C    LETR   32C3    LETR1  32D3
LLOOP  3120    LOCTN  32EC    LONG   311D    LOWER  32F5
MEMEND 32F1    MOVE   3056    MSG1   320C    NARG   0000
SCONT  30B3    SCONT1 30C5    SCONT2 30CC    SCONT3 30DB
SCONT4 30ED    SCONT5 30F4    SLOOP  308F    START  3000
TARGET 32F4    TEMP   32EF    UPPER  32F3    WRTHDR 3066

CMD=MEMDIAG.TXT >/P
```

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The Secret to Loading Those Double-Speed Tapes

By Craig Carmichael

> ***"Too many people buy disk drives because cassettes are slow to use, without realizing that the full speed of the cassette is not exploited."***

Have you got lots of long files to `CLOAD` and `CSAVE`? Or, have you accidentally taped your favorite game at double speed? Anyone who is familiar with the Color Computer, and whose `POKE 65495,0` works, is probably also familiar with the double-speed `CSAVE`. These individuals also know that a simple `POKE 65495,0`, unfortunately, does not enable them to load the tapes back into the computer.

The problem is this: `POKE 65495,0` takes the Color Computer from "slow" (normal) clock mode to "address-dependent" mode. In address-dependent mode, the computer runs at normal speed when the memory being accessed is RAM, from zero to 32767, and at double speed when accessing ROM, 32768 and up (BASIC, Extended BASIC). During a `CSAVE`, there aren't many calls to RAM, so the operation is nearly double speed. However, `CLOAD` makes considerable use of RAM, and thus does not operate at the same speed as the `CSAVE`. The exasperating thing is that double-speed tapes are perfectly good! All we need is a way to load them.

The first method I tried involved connecting my tape recorder's drive belt to a variable speed electric drill and running the tape recorder at my guess of half speed! As an emergency measure, it had its merits, working about one time in four with a steady hand, but this is not the method I shall detail here.

My next idea was to rewrite the cassette routines as machine language utility programs, which could be run as much as three times as fast as the regular ones, but luckily, other commitments and procrastination eliminated this idea.

Then I got a copy of *The Facts for the TRS-80 Color Computer* (a technical book by Spectral Associates, $15.95)

(Craig Carmichael is a British Columbia Institute of Technology digital electronics graduate who has learned machine language programming at home. His favorite chip is the 6809. He is presently designing and programming industrial computers for heating system control. Craig and his wife, Carla, live in Victoria, British Columbia.)

and browsing through it, I noticed an overlooked detail. Memory Locations 8F, 90 and 91 Hex in RAM determine the width of pulses the computer accepts as a '0' or a '1' from the tape. So, here is the priceless secret: After you `POKE 65495,0`, `POKE 143,15:POKE 144,20:POKE 145,7` and all those double-speed tapes will load perfectly!

Too many people buy disk drives because cassettes are slow to use, without realizing that the full speed of the cassette is not exploited. The cassette interface on my homemade computer runs at 4.5K Baud, three times the regular speed of the Color Computer's.

I usually program in machine language, and I have now incorporated the double-speed cassette functions as an automatic feature of my assembly editor and as an optional feature of my test editor for saving lengthy files. I have had no I/O Errors using double speed, except with a bad tape. There is, of course, less possibility of running over a bad section of tape since the programs save in a shorter time!

Comments

1) To recap: When recording, simply use `POKE 65495,0` "`DOUBLE SPEED POKE`", and when loading, use `POKE 65495,0` with `POKE 143,15:POKE 144,20:POKE145,7`.

2) If your computer doesn't work in address-dependent mode, see Page 78 in the January 1983 RAINBOW for ideas on how to get it running.

3) To get back to regular speed loading without turning off the computer, `POKE 65494,0:POKE 143,18:POKE 144,24:POKE 145,10`.

4) If your tapes don't load flawlessly, you could try `POKE 146,1` (or more) before you record to increase the length of leader tape sent at the start of each block, since this is the most common trouble spot with any tape. Next, tape recorders that have a manual record level adjustment make better quality recordings than those with ALC record levels.

5) You could also try changing the `POKE` values at 143, 144 and 145. The values given are simply the first ones that gave me good results.

6) If all else fails, get a couple of adapters and hook up your stereo cassette deck. I confess to using an AKAI CS-34D at all times, which means I am only guessing about whether many people will have trouble with portable tape recorders at the higher speed.

Rules

1) Use double speed only for your personal tapes. Even if others know how to load a tape at double speed, they won't be expecting to receive a tape in this format. The regular speed *is* standard.

2) Clearly indicate on the cassette label "FAST" when you have recorded a tape at double speed.

Due to speed differences between cassette recorders, the `POKE` values may have to be adjusted a bit if a program is `CSAVE`d on one unit and `CLOAD`ed with another model of cassette recorder.

There you have it! So simple, yet such a timesaver if you do a lot of `CSAVE`ing and `CLOAD`ing, and a lifesaver if you've accidentally saved a tape at double speed.

(You may write to the author with any questions at 820 Dunsmur Road, Victoria, British Columbia, Canada, V9A 5B7. Please include an SASE.)

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

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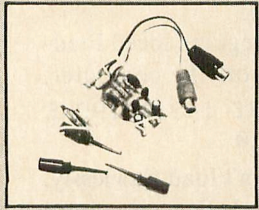

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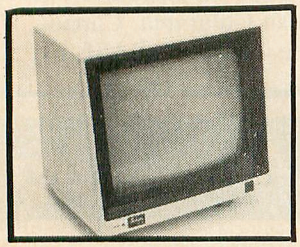

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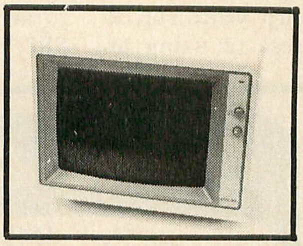

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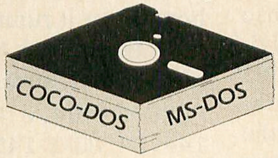

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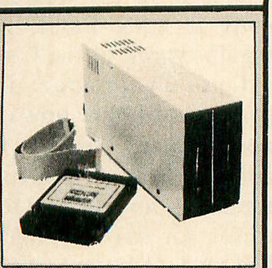

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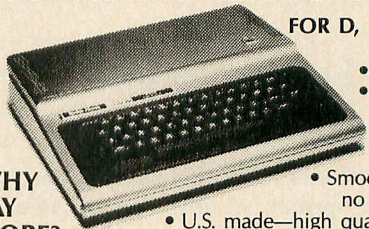

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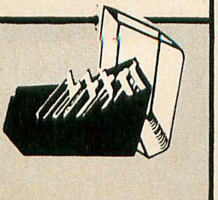

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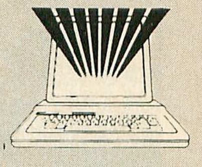

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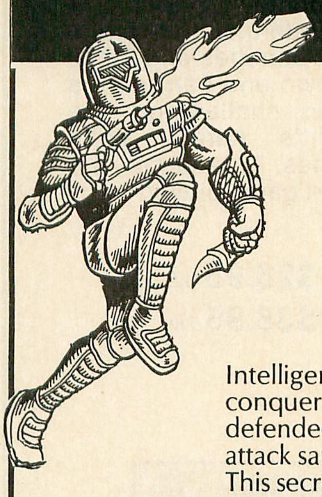

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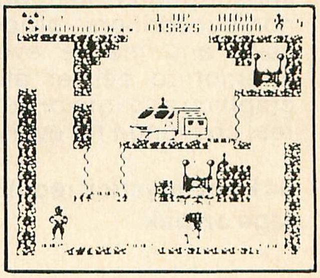

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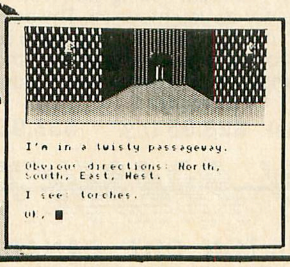

```
I'm in a twisty passageway.

Obvious directions: North,
South, East, West.

I see: torches.

OK, ■
```

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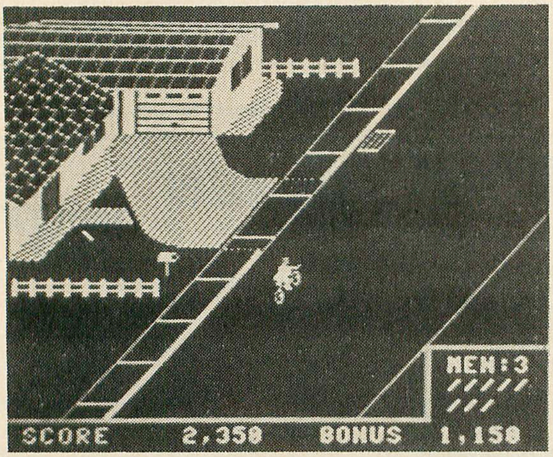

As a paper boy, you ride your bike along your route delivering papers to your customers. Break customers' windows or damage their property and they will cancel their subscriptions! Earn bonus points by damaging non-subscribers' property. Avoid pedestrians, cars, and maybe even a mad dog in your attempt to deliver all your papers! Detailed graphics and lots of surprises make this game a real challenge for everyone.

64 k and joystick required
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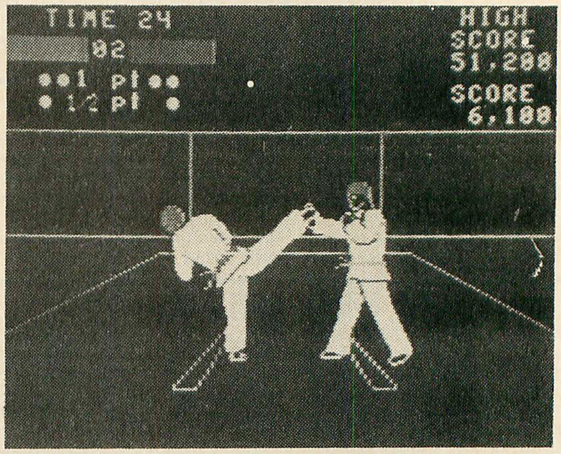

Challenge the computer, or a friend to a Karate match! You can even challenge an opponent across town if you have a modem. In this game, you will use various Karate punches and kicks to knock your opponent down and earn points to win the match. When challenging the computer, your opponent's Karate skills increase as you win matches. This game is a challenge for even the expert game player.

64 k and joystick required
tape or disk

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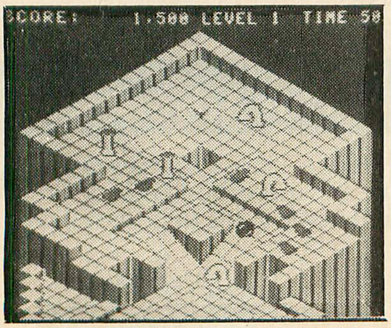
MARBLE MAZE

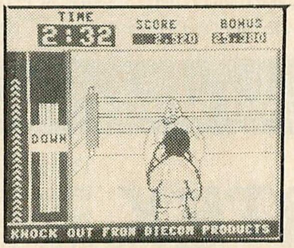


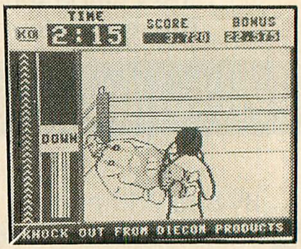
Move your marble around the mazes in your search for the finish line! Avoid the marble eaters, acid puddles and other creatures that inhabit the mazes. Avoid falling into holes or off the edges of the maze. Eight different levels and great graphics make this game a must for your collection. Congratulations to the contest winners!

64 k and joystick required

tape or disk **$28.95** *U.S.*
$38.95 *Can.*

KNOCK OUT





Fight against five different boxers in this great boxing game! At first the boxers are easy to knock out, but beware, it gets harder as you move on. The boxers are out to stop you in your quest to become champion of the world. But once you become champion your task is not over. You will then have to defend your title against those trying to regain the championship from you. Outstanding graphics make this a must for your collection!

64 k required

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The RAINBOWfest Reporter

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October 1985
Prospect, Kentucky
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Editor: Tamara Dunn
Writer: Jeffrey S. Parker

Nearly 13,000 break attendance record at RAINBOWfest-Princeton

Princeton, N.J. — Nearly 13,000 people thronged to Princeton, New Jersey, Oct. 11-13 for the largest RAINBOWfest to date. Under rainy and cold New England fall skies, the record-breaking crowd arrived at the Hyatt Regency-Princeton Hotel to hear seminars on the latest developments in the CoCo Community, see new products being introduced, like *CoCo Max II* and *PenPal*, purchase disk drives for well under $100, and have an opportunity to meet noted members of the CoCo Community.

The keynote speaker for this RAINBOWfest was Bill Barden, author of some 30 books and Color Computer technical expert. Bill's words at the Community Breakfast were optimistic as he spoke of a strong future for the CoCo and said that "Radio Shack will be around forever."

CoCo users came from as far away as Canada and even Australia to speak with OS-9 expert, Dale Puckett, about his new book. Many favorite CoCo celebrities and software and hardware dealers came to Princeton, such as Frank Hogg, who kept busy demonstrating his powerful new OS-9 machine, the QT+, running OS-9/68K. Also seen in the crowd were such notables as Terry Kepner, Tony DiStefano, Dan Downard and Wayne Day, who ran the CompuServe CoCo SIG right from the exhibit hall of RAINBOWfest.

The Radio Shack booth had show specials on everything from CoCos and Model 100s and 200s to Tandy 1000s, software and peripherals.

When attendees were not crowding into the exhibit hall, a myriad of seminars on many aspects of CoCo computing were filled to capacity . The topics ranged from graphics to telecommunications, and included question-and-answer seminars.

Interest in OS-9, Tandy's powerful operating system, continued to grow in Princeton. Two seminars were given by Dale Puckett, co-author of *The Complete Rainbow Guide to OS-9*. The topics covered OS-9 and BASIC09 for beginners, and attracted more people than could fit into the seminar rooms.

An interesting feature that added to the fun and excitement of this RAINBOWfest was the concurrent running of PCMfest, hosted by Falsoft's sister publication PCM The Personal Computer Magazine for Tandy ® Computer Users, focusing on Tandy's MS-DOS and portable computers. PCMfest gave Color Computer users an opportunity to view what many consider the next logical step — MS-DOS.

CoCo Max II has its debut

New from Colorware is *CoCo Max II*, the latest version of one of the most popular Color Computer products ever. Tim Jenison, who developed *CoCo Max* and the new *CoCo Max II*, was kept busy at Colorware's booth demonstrating all the new features of *CoCo Max II*.

The new version includes all of the existing features plus 14 new fonts, a dynamic two-dimensional shrink and stretch, click to load, rotate, multiple drive capability and a clipboard of graphics stamps.

The Colorware booth stayed about 10 people deep as RAINBOWfest goers took advantage of the bargain show price of just $20 for the *CoCo Max II* upgrade.

Tim Jenison commented, "I think this is the best thing going now. Nobody else has these features to offer, especially the clipboard in memory. People just have to see it once, and then they have to have it." Tim proved to be right, as Colorware had almost run out of *CoCo Max II* packages by Saturday afternoon.

Thunder RAM thunders out the door

The first 256K memory expansion board for the Color Computer, by Spectrum Projects of Woodhaven, New York, was a smash hit at Princeton RAINBOWfest. Selling for just $99.99, by noon Saturday Bob Rosen was entirely sold out of *Thunder RAM*. This board features the capability to load four 32K programs at once, has a 60K print spooler and can emulate a 40-track RAM disk.

Also popular was the new Spectrum *Super Controller*, allowing up to four DOSs to be implemented from the same controller. *OS-9 Solution*, user-friendly software for the OS-9 environment, and *Telepatch 64*, an enhancement to *Telewriter-64* that includes a print spooler, sold for just $19.95. OS-9 users in particular were interested in both *Thunder RAM* and the OS-9 driver for it, which sells for $24.95.

Even disguised as a convict, the glasses gave him away

We've seen him with a long beard. We've seen him clean-cut. Now we've seen him with a shaved head, wearing convict's clothes! Dennis Kitsz entertained and amused us all at yet another RAINBOWfest. This time, Dennis, owner of Green Mountain Micro of LowerKit III fame, and publisher of the now defunct *Under Color* Magazine, appeared as a convict.

"I had to shave my head recently," he explained. "Someone said I look like a convict now that it's just starting to grow back, so I figured I might as well dress the part!" And dress it he did. He even gave a well-attended seminar, entitled "Your Own Color Computer Hardware," dressed as a con.

Dennis can always be recognized by his distinctive eyeglasses, which no matter what his attire, reveal his true identity. Along with his *Micro Language Lab, Color Quaver* and expansion interface cables, Dennis is best known for his outstanding customer support.

For Your Health Software introduces *House Doc*, a home medical/diagnostic program

New to the CoCo Community is For Your Health Software, developer of *House Doc*. This program was written and developed by Dr. Darrell Wells, M.D./Ph.D., and is designed to cut medical costs, treat illness at home and educate the user about diseases.

House Doc can diagnose more than 48 diseases or ailments, and Dr. Wells spent most of the show demonstrating it to prospective buyers. The program uses a unique series of matching and evaluation of symptoms entered by the user to arrive at a possible diagnosis.

House Doc then gives several possible diagnoses, listing the percentage probabilities of which illness you might have and its recommended treatment. In several cases, the recommendation is to seek medical help from a professional physician.

Howard Medical slashes monitor prices

Howard Medical Computers of Chicago, Illinois, slashed its monitor prices during the show, dropping the bottom out of the price war and leaving no clear second place.

The company featured a Zenith 13-inch 131 color monitor, with RGB and composite input, built-in speaker and 240 by 200 dot resolution for $168. The package usually has a retail price of $344.

Amidst the flurry of sales of these monitors, the price for a high resolution Zenith 123A 12-inch monochrome monitor was cut to $67.50. The monitors carry a 30-day, money-back warranty. These were the stars in a presentation of printers, stands, drives and other accessories offered at special prices.

Prickly-Pear presents new graphics Adventure

Joanne Chintis had her hands full in the Prickly-Pear Software booth without the aid of her husband and co-owner, Mike. Excited CoCo fans mobbed the booth to see the new two-disk graphics Adventure *Hall of the King*. The Adventure features high quality, fast-paced graphics and text displays, extensive game save features and a real challenge.

Prickly-Pear's new *Hall of the King* comes only a few months after the introduction of *To Preserve Quandic*, which is a two-disk Adventure also in 300K length.

Also on display were the new *Warp Factor X*, designed as a *Star Trek* Simulation by a NASA engineer; *Dr. Who*, a graphics and arcade game based on the British TV series of the same name; and an artificial intelligence program called *Crystal*.

Rosen of Spectrum Projects discovers new CoCo

Yet another CoCo version was discovered on Saturday by Bob Rosen of Spectrum Projects. This version features three ways to upgrade your CoCo and bears the new Tandy Color Computer nameplate. Until now, it had been thought that the new CoCo 2 manufactured in Korea was the only new version released. Could this be a portent of the elusive and unknown CoCo 3?

L.R. Technology connects three CoCos

Manufacturing and designing peripheral equipment for personal computers, and the CoCo in particular, is L.R. Technology of Warrington, Pennsylvania. L.R. Technology introduced its hard disk interface, its EPROM programming system and its multipurpose interface module. Among other things, this multipurpose interface module allows up to three CoCos to be connected and used together.

Attendees at the L.R. Technology booth inspected this exceptional new system. This system has excellent applications for the business user or serious OS-9 enthusiast. The interface includes two RS-232 ports, a parallel printer port and a real-time clock with a battery backup. This multipurpose package substantially enhances the power and performance of the Color Computer.

CompuServe raffles off free connect time

Wayne Day, SysOp of the Color SIG, and CompuServe hosted a raffle with a prize of several hours of free connect time on CompuServe. A new winner was announced every hour. Day also ran the SIG right from the exhibit hall during the show.

Also in the booth was Mike Ward, author of the public domain terminal program *MikeyTerm*. They were deluged with questions about CompuServe and the SIGs. People who had only known Day and Ward through their computer screens were thrilled to make face-to-face introductions with their SIG friends. Said Day, "It's not just the raffle. It's been so busy here, I get finished shaking one hand and there's another in front of me. It's been wall-to-wall people. People are fascinated with learning more about CompuServe and getting their questions answered."

Frank Hogg's new QT+ is put on display

Frank Hogg Labs has recently introduced the QT+ package. This machine is not much larger than a CoCo, but is a powerful new machine based on a Motorola 68000 chip and operates under the new OS-9/68K operating system. This multi-user system is very fast and powerful indeed, and compant president Frank Hogg spent quite a bit of time at RAINBOWfest showing off the virtues of his new QT+. Interest in this machine was quite high, particularly among the many OS-9 users present.

According to Hogg, "This machine is so powerful running OS-9/68K that nothing can even come close. We have all the software needed to support it, too. This is an OS-9 user's dream come true!" In addition to the QT+, FHL had many software and hardware items available at special show prices.

Four Star Software heralds *PenPal* integrated software

Four Star Software of Ontario, Canada, introduced its new *PenPal* integrated software. Featuring a Hi-Res 51 by 24 screen and full telecommunications capabilities, this package also includes a text editor, spreadsheet, graph generator and database program.

PenPal is designed to be user friendly. Twelve function keys and a command reminder as well as online help are always available to the user. All of *PenPal*'s modules interface with one another.

Because the program is designed to be learned in a day and is very easy to use, interest was high in this innovative new development. With so many powerful features, and at the special price of $69.95, show-goers leaped at this one-time-only opportunity.

Computer Plus cuts price of the Gemini SG-10

Computer Plus of Littleton, Massachusetts, was in fine style at this RAINBOWfest. Their big show special was the Gemini SG-10 package for $225, a price that could not be matched. In addition to huge discounts on printers, Computer Plus also discounted all prices on Radio Shack equipment and software by 10 to 20 percent. Computer Plus is an authorized Radio Shack dealer and well-known for its excellent prices and incomparable customer support.

J&M Systems, Ltd. introduces 3½-inch Winchester with OS-9 driver

J&M Systems, Ltd., of Albuquerque, New Mexico, featured its new JFD-CP controller. This controller has ROM sockets for both Disk BASIC and J-DOS 1.2. The controller features a switch to toggle between DOSs. Also built into the new CP controller is an eight-bit parallel port for printer support. The port can be used to drive a Winchester hard disk drive. With its gold contacts, this controller is among the most sophisticated pieces of equipment for the CoCo.

In addition to the JFD-CP controller, J&M also introduced its new 3½-inch 10-megabyte Winchester hard drive for the CoCo. This drive is small, fast and efficient, and with its massive storage capabilities and OS-9 driver, came under serious consideration by avid OS-9 users. J&M Systems also featured 5-, 10- and 20-meg hard drives for the CoCo.

Price war erupts between Southwestern Digital and Computer Center

Southwestern Digital and Computer Center went toe to toe on disk drive prices. From the start, these two companies' prices were only a few dollars apart, but by Sunday, the price war had grown to epic proportions as attendees flooded the booths in an impassable barrier of buyers.

The winner? The RAINBOWfest attendees, of course, as Southwestern Digital dropped their price for a single-sided, double-density Drive 0 with a J&M controller to just $130.

The Computer Center came in right behind with a price tag of $134 for a single-sided, double-density Drive 0 with Radio Shack controller.

Falsoft arrives in full force, fine style

"When someone comes to a RAINBOWfest," said Lonnie Falk, publisher of RAINBOW and PCM magazines, as he gazed over the Saturday afternoon crowd, "I want them to know they have come to something special. This is an event, an important happening. People need to know that, particularly after coming all this way to see it."

Lonnie took the time at the CoCo Community Breakfast to introduce well-known CoCo Community personalities and most of the members of his staff from Falsoft, Inc. He commented on the trials and tribulations involved in moving into a new building, which was Falsoft's current big matter at hand. "Our move-in date is in the middle of November," he commented, "but we've been hearing about occupancy next month since last year! I'll believe it when we've moved in."

Lonnie was also presiding over a new show, PCMfest, running concurrently with RAINBOWfest for the first time. He was pleased both with the results of the show and the CoCo Community's reaction to this added attraction at RAINBOWfest.

The Falsoft booth had its hands full as Submissions Editor Jutta Kapfhammer and RAINBOW Technical Editor Dan Downard, together with Danny Humphress of PCM Magazine and Willo Falk, RAINBOWfest site manager, attempted to handle the swarm of eager attendees. Falsoft was selling its full line of products: RAINBOW magazines, binders, books and RAINBOW ON TAPE. Falsoft also introduced *The Second Rainbow Book of Adventures* at the show.

"The CoCo is so much more than a game machine," said Falk. "When people come to an event like this and show their support, you can feel it in the air. Serious products like OS-9 show it, and the people prove it. The future for this machine is a strong future, and the people know it. Falsoft is strong, too, and getting stronger all the time. When people come to a RAINBOWfest they know we'll always be there to support them."

MichTron debuts *Rommel 3D*

MichTron, Inc. of Pontiac, Michigan, introduced its newest arcade-style game, *Rommel 3D*. This fast-paced action game is controlled from the keyboard with the arrow keys, and is a remarkable version of the popular arcade game involving tanks on a battlefield. The game is true to the original, including smart tanks and radar, a pause game feature and extremely high quality 3-D graphics that will delight the user.

In addition to *Rommel 3D* being sold at a special show price of $24.95, MichTron featured other well-known software and hardware specials both for the CoCo and Tandy 1000.

Moreton Bay Software highlights new RAM Disk

Moreton Bay Software stayed busy as Steve Bjork, of *Bjork Blocks* fame, demonstrated his newest program, *Motion Pictures*. This graphics editor makes extensive use of layers and foreground/background image processing.

Also highlighted was the new killer video 256K, featuring a 16-color, 80-column CoCo 2 with an internal RAM Disk, and More Keys, the keypad developed for serious number crunching, was on display. A great deal of attention was paid to *Hot Slot*, a casino Simulation program — not just another slot machine!

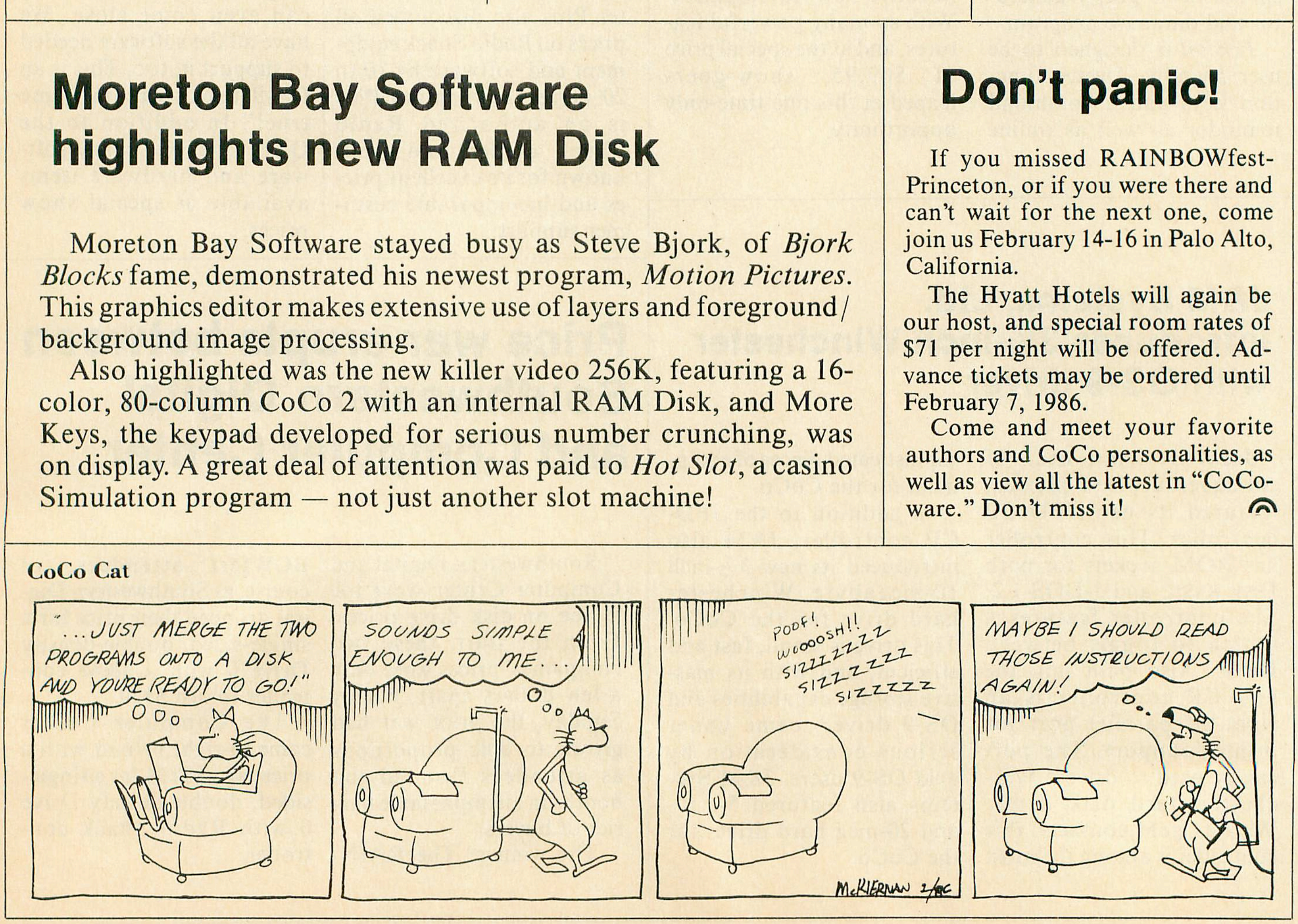
Don't panic!

If you missed RAINBOWfest-Princeton, or if you were there and can't wait for the next one, come join us February 14-16 in Palo Alto, California.

The Hyatt Hotels will again be our host, and special room rates of $71 per night will be offered. Advance tickets may be ordered until February 7, 1986.

Come and meet your favorite authors and CoCo personalities, as well as view all the latest in "CoCo-ware." Don't miss it!

CoCo Cat


"...JUST MERGE THE TWO PROGRAMS ONTO A DISK AND YOU'RE READY TO GO!"
SOUNDS SIMPLE ENOUGH TO ME...
POOF!
WOOOOSH!!
SIZZZZZZZ
SIZZZZZZZ
SIZZZZZZ
MAYBE I SHOULD READ THOSE INSTRUCTIONS AGAIN!
McKIERNAN 2/86

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PANASONIC KX 1090 (PAR) (80 CPS F/T)	$224.00
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(300 BAUD - Manual Answer/Dial)		
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(300/1200 BAUD - Auto Answer/Dial)		
AUTOTERM WITH	T	D
VOLKSMODEM (See Below)	$95.95	$99.95
VOLKSMODEM 1200	$249.95	$254.95

CoCo MAX

COCO MAX	$66.45
Y BRANCH CABLE	$25.95

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VIDEO 300 (Green, No Glare)	$149.00
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ADAPTOR (For Post - 10/82 COCO)	$3.65

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ELEPHANT SSDD	$18.50	$17.50
ELEPHANT DSDD	$22.00	$21.00
BASF QUALIMETRIC SSDD	$19.00	$18.00
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* THE SOURCERER (R DOS)	$27.95	$31.95
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■ VIP CALC	$55.95	—
■ VIP TERMINAL	$39.95	—
■ VIP DATA BASE	$47.95	(DISK)
■ VIP DISK-ZAP	$39.95	(DISK)
■ VIP INTEGRATED LIBRARY	$119.95	(DISK)

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(See page 15 of Rainbow)		

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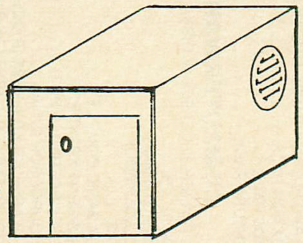

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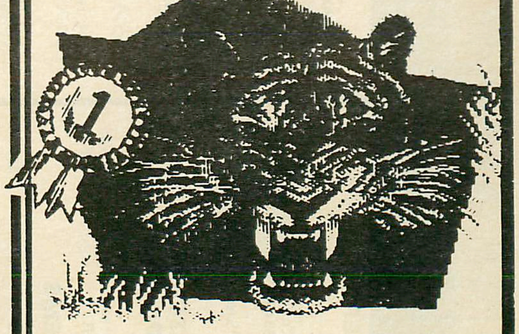
DRAWN USING MASTER ARTIST BY THE AUTHOR OF THE PROGRAM



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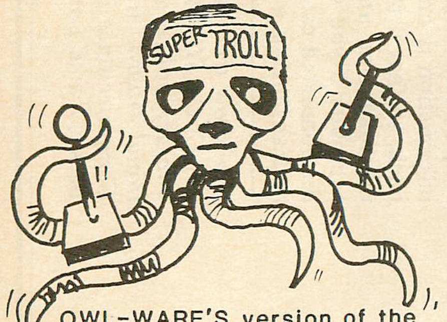

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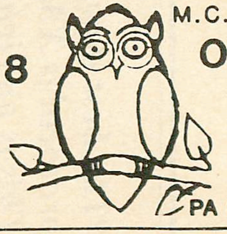

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LEARN EVERYTHING ABOUT DISK BASIC FROM THIS MACHINE LANGUAGE PROGRAM. THE TUTOR TAKES YOU STEP BY STEP THROUGH THE LESSONS AND CORRECTS YOUR MISTAKES A MULTI-LESSON TUTORIAL THAT WILL GIVE YOU QUICK, PAINLESS KNOWLEDGE OF DISK BASIC (THIS PROFESSIONALLY WRITTEN TUTOR IS EASILY WORTH THE BUNDLE'S TOTAL PRICE).

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Some Notes on Downloading

By John R. Curl
Rainbow's CoCo SIGOP

"The best download protocol is XMODEM. This is an eight-bit, error-free checksum file transfer. To do an XMODEM download, type XM and press ENTER at the action prompt."

Welcome back to the "Delphi Bureau"! If one of your presents from Santa was a new modem, we welcome you to the wonderful world of telecommunications and invite everyone to join us on Delphi's CoCo SIG.

Since last month's column was an introduction to the CoCo SIG, this month I hope to give you some insight on the workings of the CoCo SIG. The abbreviated, modified "Delphi Command Card" has been printed with Delphi's permission for RAINBOW readers. It contains the commands and options used in the major areas of Delphi, including the CoCo SIG. The information is on one page, front and back, so that it may be removed from the magazine and kept beside your computer if you wish. One note about the command card: Whenever it refers to transferring a file to your disk, it actually means to your *buffer*. Delphi automatically transfers to disk only if your terminal program supports this feature.

THE RAINBOW staff has been hard at work continually trying to enhance the CoCo SIG. Back issues of RAINBOW ON TAPE are being uploaded to the RAINBOW ON TAPE topic section of our database. The source code listings for machine language programs and the OS-9 listings from THE RAINBOW are also being uploaded into the RAINBOW ON TAPE section. This is one thing that we are unable to include on the RAINBOW ON TAPE cassette.

We now have our "Shopping Service" fully activated. You can order various products or services from this area: individual cassettes of RAINBOW ON TAPE or a year's subscription, RAINBOW magazine binders, books from The Rainbow Bookshelf. You can even subscribe to or extend your subscription to RAINBOW magazine. Soon, you should be able to purchase products from other vendors in the "Shopping Service." This is an attempt to serve you quickly and more efficiently.

Because of a need expressed by our

(Rainbow technical assistant and Delphi CoCo SIGOP John Curl is also a military policeman in the Army National Guard. He has had his Color Computer since 1982. He and his wife, Becky, live in Louisville, Kentucky.)

DELPHI™

This abbreviated, modified version of Delphi's command card has been created to help our readers who use Tandy® Color Computers get started quickly on Rainbow's new COCO SIG. It is being reproduced here for your convenience and can be removed, if you wish, and kept near your computer for easy reference.

WELCOME TO DELPHI

Most Delphi commands are self-explanatory. This card will serve as a handy backup reference.

Signing onto Delphi Directly

1. Dial (617)-576-0862.
2. When you have carrier, press [ENTER] once or twice.
3. At "USERNAME" type your membername and [ENTER].
4. At "PASSWORD" type your password and [ENTER].

How To Sign On Using Uninet

1. Dial your local Uninet number.
2. Hit [ENTER] [.] [ENTER] at the |x| or "L?" prompt.
3. Type DELPHI or GVC at the SERVICE prompt.
4. Then type your USERNAME and PASSWORD as outlined above.

How To Sign On Using Tymnet

1. Dial your local Tymnet number.
2. When "PLEASE TYPE YOUR TERMINAL IDENTIFIER" appears, type A.
3. When "PLEASE LOG IN" appears, type DELPHI.
4. Then type your USERNAME and PASSWORD as outlined above.

How To Sign On Using Datapac (Canada)

1. Dial your local Datapac number.
2. Type [.] for 300 baud or [.] [.] for 1200 baud.
3. Type Set 2:1, 3:126 for full duplex allowing deletes.
4. Type p 1 3106, DELPHI; [ENTER] (Tymnet)
5. Then type your USERNAME and PASSWORD as outlined above.

To obtain your local access number you may call Tymnet at 800-336-0149 or Uninet at 800-821-5340. If you have problems at any time, call Delphi toll-free at 1-800-544-4005. (Mass. 617-491-3393)

Note: Most commands require only enough letters to be entered to make them unique. For example, to enter CONFERENCE from the Main Menu, simply type "C" and [ENTER]. Do not press [ENTER] after commands using the Control Keys. Most other commands require pressing [ENTER] to activate them.

Typing BYE from any prompt (except the MAIL prompt) will log you off of Delphi.

Typing [?] [ENTER] will generally display a full menu or provide help.

IMMEDIATE COMMANDS (Can be used at any time.)

/HELP — lists Immediate Commands.
/ECHO — turn on character echo.
/NOECHO — turn off character echo. (Used after setting terminal or Uninet or Tymnet node to produce echo.)
/EXIT — exit to next higher menu or command level.
/GAG — turn off incoming /PAGE or /SEND messages.
/LENGTH — shows current number of lines per page on your screen or sets new length.
/NOGAG — turn on incoming /PAGE or /SEND messages after using /GAG.
/PROMPT (1, 2, or 3) — 1=no menu, no explanation; 2=no menu, some explanation; 3=menu plus explanation.
/TIME — show current Eastern time and date.
/WHOIS (username) — shows profile of member (if available).
/WIDTH — shows current screen width format or sets new width.

DATABASE

DIRECTORY — display a directory of all files in the topic.
EXIT — exit database.
HELP — get help on database actions and commands.
READ — read a description of a file. (You must read the file before you download it.)
SEARCH — search a topic by keyword.
SET TOPIC — switch from one topic to another without leaving the database section.
SUBMIT — submit a file for inclusion in a topic. The file must be in your workspace.
WORKSPACE — enter your workspace area.

In order to access a file, you must first READ (filename). Once you have read a file, the following actions are available:

DESCRIPTION — displays the file's description again.
DISPLAY — display/list the file on your screen.
DOWNLOAD — use with the buffer capture method of downloading.
EXIT — return to the database prompt.
HELP — get help on commands and actions.
LIST — like display; list a file in an unformatted format.
NEXT — advance to the next group or file. ([ENTER] defaults to NEXT.)
XMODEM DOWNLOAD — download the file using the Xmodem protocol.

WORKSPACE

Workspace is an area for you to store files and messages of all types. This is where you must first upload a file before submitting it to a database. You can file forum messages for retrieval later. Mail messages can be stored here.

From the COCO SIG> prompt type DA, and pick a topic, then type WO to reach Workspace.

APPEND — append one file to another.
CATALOG — shows which files you have created.
COMMON — go to the Delphi Common work area.
CREATE — creates file and stores it in your area.
DELETE — deletes files you no longer need.
DOWNLOAD — download a file from Delphi to your disk.
EDIT — create and edit your own text files.
EXIT — return to Main Menu.
HELP — explanation of WORKSPACE commands.
HOME — return home to your private work area.
LIST — lists contents of any file in your catalog.
PURGE — delete all but current version of duplicate files.
UPLOAD — upload a file from your computer to Delphi.
XDOWNLOAD — download via XMODEM protocol.
XUPLOAD — upload via XMODEM protocol.

COCO SIG FORUM

ADD — start a new message thread with a different topic.
BACK — moves backwards within a thread.
DELETE — delete a message.
DIRECTORY — display a directory of messages.
EDIT — edit the current message.
EXIT — exit forum.
FILE — put a copy of a message in your workspace.
FOLLOW — follow a message thread. Read only the messages of a particular thread.
FORWARD — send a copy of a message by mail.
HELP — get help on forum actions and commands.
HIGH — set/show the high message number.
MAIL — take you directly to mail.
NEXT — read next message. ([ENTER] defaults to NEXT.)
READ — read a message. (Typing message number will read that message.)
REPLY — reply to a message.
TOPICS — set/show message topic.

CONFERENCE

EXIT — return to Main Menu.
JOIN (groupname) — join existing group or start new one.
NAME (newname) — change your name or "handle".
PAGE (username) — pages another user in the system.
SCHEDULE — transfer you to the Conference Schedule.
WHO — lists all current users and Conference groups.
Conference Immediate Commands (use while in Conf).
/ACCEPT — accept another's page from within current group.
/ANSWER — respond to or decline PAGE from another user.
/CANCEL — terminate a PAGE to another user.
/EXIT — like CONTROL-Z; gets you out of wherever you are.
/GAG — disable /SEND's from people outside your conference group.*

/GLOCK — lock the group's attributes.*
/GNAME (newname) — change current group name.
/GPASS (password) — select a group password.*
/GPRIVATE — make the group private.*
/GQUIET — makes the group have silent entry and exit.*
/HELP — get help on conference actions and commands.*
/JOIN (groupname) — join an existing group.
/LOG — save a transcript of your conference in your workspace.*
/MAIL — takes you directly to Mail.
/NAME — create a conference nickname (handle).
/PAGE — ask another user to join your group.
/PASS (password) — say the password for admittance into password groups.
/REJECT — a pleasant "No thank you" to whomever is paging.
/REPEAT — turns Echo on or off.*
/RNAME (nickname) — show the username of a person using a handle.
/SCHEDULE — transfer you to the Conference Schedule.
/SEND (username) — send message to current user.
/SQUELCH (username) — ignore messages from a user.*
/TALK — like /JOIN, but doesn't leave current group. /# also works, where # is the number of a conference group. Allows you to participate in more than one group at the same time.
/WHO — lists all current users and Conference groups.
/WHOIS (username) — displays (username) Profile.

*Note: Many of these commands may be preceded by NO. For example, /GAG disables sends, but /NOGAG resumes them.

DELPHI MAIL

Primary Mail Menu (DMAIL)
CATALOG — lists all Mail files you have created.
EXIT — return to Main Menu.
HELP — explanation of Mail commands.
MAIL — send or read mail. Enters Secondary Mail Menu.
SCAN — display the headers for all unread mail.

Secondary Mail Menu (MAIL)
[ENTER] — depressing the return or carriage return key, will read the next message or more of the current message.
BACK — displays previous message.
DELETE — deletes current (last read) message.
DIRECTORY — lists summary of your mail messages.
DIRECTORY /FOLDER — lists folder names.
DIRECTORY (folder name) — lists summary of messages in the specified folder. For instance, DIR Pending.
EXIT — returns to Main Menu.
EXTRACT (filename) — adds current message to named file.
FILE (folder name) — adds current message to the named folder.
FORWARD — forward present message to others.
NEXT — skips to next Mail message. ([ENTER] defaults to NEXT.)
READ — displays your Mail messages.
READ (folder name) — reads contents of named Mail folder.
READ (n) — allows you to read selected message number.
READ /NEW — for new MAIL arriving while in MAIL.
REPLY — sends a reply to sender of current message.
SEARCH (string) — searches current Mail file for specified character string.
SELECT — pick messages for delete operation.
SEND — sends message to another user or users.
SEND (filename) — sends file (filename) to other user(s).
SEND /EDIT — calls editor to edit message being sent.
SEND /LAST — uses last message as text for current message.

HELP

Contains a full description of all Delphi services using the same structure as the Delphi Menus.

PEOPLE ON DELPHI

Enter information about yourself; find out about others.

This section is accessed from the Delphi Main Menu. When someone does a /W command in conference, this is the information that will be displayed about a member.

I-AM — add or change information about yourself.
ADD — adds to existing information.
CHANGE — removes all current information about you and request new info.
DELETE — deletes all information under a given keyword heading.
DISPLAY — prints your personal profile.
EXIT — returns to Main Menu.
WHOIS (membername) — displays member profile if available.
SEARCH — find members with particular interests.
BROWSE — browse through member profiles.
LIST-KEYWORDS — shows keywords used in member profiles.

USING-DELPHI

ADVICE FROM DELPHI — answers to most frequently asked questions.
CREDIT POLICY — explanation of current DELPHI policy.
GUIDED-TOUR — a brief version of the tour you took at signon.
MAIL TO SERVICE — send comments and suggestions to DELPHI.
NETWORK-INFO — phone numbers and login procedures for data networks.
PREMIUM-SERVICES — information concerning the extra cost services.
RATES-AND-PRICES — official Delphi rates and prices.
SETUP — terminal and network configuration.
LENGTH — lets you find your screen length and tailor Delphi accordingly.
MENU — choose default menu at sign-on.
PASSWORD — change your password. (frequent changes are recommended.)
PROMPT — select level of menu prompting desired.
SET-TYMNET — experiment with setting network parameters.
TERMINAL — special features for DEC VT100 and VT52 users.
WIDTH — tailor Delphi to fit your screen width.
USAGE-HISTORY — view your to-date activities on Delphi.

DELPHI TERMINAL CONFIGURATION GUIDE

8 bit ASCII*
1 stop bit*
no parity*
asynchronous
full-duplex
no auto-linefeed or carriage-return linefeed
XON-XOFF or Handshaking should be enabled

*sometimes you have to experiment with other combinations such as: (7 bit, 1 stop, noparity) or (8 bit, 1 stop, even or odd parity).

NOTES

To erase a character, Delphi uses the ASCII delete/rubout key which is decimal 127. If necessary, the terminal program should translate the backspace key to a delete/rubout. Unfortunately the networks do not echo the delete/rubout correctly however it will have the desired effect.

Delphi uses the following control characters:

CONTROL-Z — end of input or exit to next higher menu.
CONTROL-S — suspends sending.
CONTROL-Q — resumes sending.
CONTROL-O — skips to end of file or message.
CONTROL-U — cancels input for current line.
CONTROL-R — redisplays current line.
CONTROL-X — cancels everything typed ahead but unsent.
CONTROL-C — cancel current activity and start over.

If a particular control key is causing the terminal program to take some other action, then the terminal program should be reconfigured to use any of the other available control keys in place of the one required by Delphi.

Modified Command Card for Rainbow Readers

DELPHI™

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members, the Database section has been expanded to include a Data Communications topic section. This was neccessary because of the growing number of telecommunications-related files. All of the telecommunications files that were in the Home Applications topic section have now been moved to their new home in the Data Communications section.

This brings up another subject of member needs, *MTERM* (*Mikeyterm*). *MTERM 4.0* is now available in the Data Communications section. This version supercedes all other versions of *MTERM*. This group of files includes the machine language program, the BASIC loaders to `POKE` the machine language program into memory, the configuration program and the document files. You no longer have to search for the different versions to drive the serial port, the Deluxe RS-232 Pak or the PBJ *Word-Pak*; *Mikeyterm 4.0* supports any combination of these.

This is an excellent terminal program that is free for the downloading and supports XMODEM file transfer protocol. If your current program supports XMODEM, you can download the machine language file and execute it. If your terminal program does not have advanced file transfer capabilities, you may need to use the buffer capture method to download the BASIC loaders and then create the machine language program offline.

Several members have expressed problems about the downloading process. In order to download a file, go to the Database section from the CoCo SIG prompt. This is accomplished by typing `DA` and pressing ENTER at the prompt. Then choose which topic section you would like to go to. At the topic prompt, you can do a `DIR` and see a list of all of the files in that topic section. If you see a file that interests you, read the file (READ filename) — this presents you with a description of the file. You are now at the action prompt. If you want to return to the topic prompt, use the EXIT command or CONTROL-Z. If you would like to read the next file or group of files, type `NEXT` and press ENTER or just press ENTER alone. If, however, you would like to download the file, you have several options.

The best download protocol is XMODEM. This is an eight-bit, error-free checksum file transfer. To do an XMODEM download, type `XM` and press ENTER at the action prompt. You are then informed when to initiate XMODEM receive on your terminal program. Your terminal program must specifically support XMODEM in order to use this function. This type of transfer ensures that the program does not have any dropped characters or erroneous characters when downloaded.

Also, there is the DOWNLOAD option. This can be used with the buffer capture method of downloading. When this function is invoked, you are prompted to press ENTER to begin. This allows you to open your buffer. Once the file has been displayed, close the buffer and dump it to either disk or cassette. You may have to use a word processor to remove any extra characters from the file so the program can be run.

> ***"We encourage regular uploads to be in ASCII format to enable buffer capture of the files. This allows all of our members to access them."***

There are also the LIST and DISPLAY commands. These are unformatted listings of the file. When using these options, you definitely have to use a word processor to clean up the file. This is the least desirable type of file transfer.

RAINBOW ON TAPE programs have been uploaded in binary form to promote the use of XMODEM downloading of the files. The reason for this is to make certain you receive an error-free download of the file. Remember that there is a surcharge applied to these programs. Therefore, it is in your best interest to use XMODEM transfer. If your terminal program does not support XMODEM, then you may want to download *MTERM* to use when downloading.

We encourage regular uploads to be in ASCII format to enable buffer capture of the files. This allows all of our members to access them. An error is easily dealt with by downloading the program again, and doesn't add any surcharge to your Delphi account.

We also encourage members to upload public domain programs to be included in our database for other members to share. We wish to thank the following people for taking the time to upload files to our database this month:

Rodger Alexander (SALZARD), ***Diet:*** This program keeps a daily account of calorie input by food description and daily weight records. A monthly weight chart is available to keep track of your progress.

Devin Cook (ELECTROMAGIC), *MASTER/TRM:* A terminal program for use with the Deluxe RS-232 Pak. It supports 300/1200 Baud and has a 40-column Hi-Res screen.

Marty Goodman (MARTYGOODMAN), ***"Complete Newbox Series":*** The up-to-date compilation of Marty's thoughts on how the CoCo should have been handled by Tandy.

Bill K. Haesslein (BILLH), ***Disk Utility:*** A utility program that makes life with your disk drives easier.

Stephane Venne (SVENNE), *STRE KSV/BAS:* A graphics picture made using *CoCo Max* — the "NCC 1701 Enterprise."

Douglass Trites (RUGBY), ***Xmastags:*** This program generates Christmas tags on a CGP-115 Color printer. The instructions are embedded in the program using `REM`ark statements.

Look forward to better things on Delphi and more conferences with "Who's Who of the CoCo World" in the near future on the CoCo SIG. Also, we plan to initiate an interesting contest very soon. Delphi has promised to take care of several things that you, our members, have complained about.

If you have any questions or suggestions you would like to be addressed, either leave me a message on the CoCo SIG under username RAINBOWMAG, or write to me in care of THE RAINBOW.

Until next month, meet me and the rest of THE RAINBOW staff on Delphi's CoCo SIG and share in the wealth the Color Computer Community has to offer.

"The CBASIC Compiler"

Now anyone can create fast efficient Machine Language Programs Easily and Quickly without having to use an Editor/Assembler

CBASIC is a fully integrated, easy to use Basic program Editor and Compiler package. CBASIC is 99% syntax compatible with Disk Extended Color Basic programs, so most Basic programs can be loaded and compiled by CBASIC with little or no changes required. The compiler is an optomizing two-pass integer Basic compiler that can convert programs written in Disk Extended Color Basic into 100% pure 6809 Machine Language programs which are written directly to disk in a LOADM compatible format.

The programs generated by the compiler can be run as complete stand alone programs. A built-in linker/editor will automatically select one and only one copy of each subroutine that is required from the internal run-time library and insert them directly in the program. This eliminates the need for cumbersome, often wasteful separate "run-time" packages.

CBASIC WAS DESIGNED FOR BOTH BEGINNING & ADVANCED USERS

CBASIC is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. The Beginner or Novice programmer can write and compile programs without having to worry about Stack Pointers, DP registers, memory allocation, and so on, because CBASIC will handle it for you automatically. All they have to do is write their programs using the standard Basic statements and syntax. For the advanced Basic and Machine Language programmers, CBASIC will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines or functions.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset, and On Error handling. It also has advanced programming features that allow machine level control of the Stack and Direct Page registers, variable allocation, automatic 64K RAM control, program origin and even multiple origins. It can even have machine language code generated within a program that executes just like any other Basic program line.

FULL COMMAND SUPPORT & SPEED

CBASIC features well over 100 Basic Commands and Functions that fully support Disk, Tape, Printer and Screen I/O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, and all with 99.9% syntax compatibility.

CBASIC is FAST. Not only will CBASIC compiled programs execute 10 to 1000 times faster than Basic, but the time it takes to develop a CBASIC program versus writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC in a matter of days or hours, even for a well experienced machine language programmer. We had a report from a CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes". Another user reported a program that took 1 to 1½ hours to run in Basic, now runs in 5 to 6 minutes!!!

MORE THAN JUST A COMPILER

CBASIC has its own completely integrated Basic Program Editor. The Editor contained in CBASIC is used to Create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built-in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving, Appending (merging), Killing disk files and displaying a Disk Directory. It also has automatic line number generation for use when creating programs or inserting sequencial lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "falling off a log". If CBASIC finds an error when compiling, it points to the place in the program line where the error occurred. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple.

HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51, 64 or 85 by 24 line display. It is also the only compiler that supports both the PBJ "Word-Pak" and the Double Density 80 column cards. All of these display formats are part of the standard CBASIC compiler package. Not only can these display formats be used for normal program editing and compiling, but CBASIC will also include them in your compiled programs! If you want CBASIC to include the display driver in your program, all you have to do is use a single CBASIC command "HIRES". The run-time display driver that CBASIC includes in your program is not just a simple display, but a full-featured display package. With the Hi-Resolution display package you can mix text & graphics, change characters per line, underline, character highlight, erase to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more. All commands are compatible with our HI-RES II Screen Commander so you can easily develop screen layouts using HI-RES and Color Basic before you compile your program. The same applies to using the 80 column card drivers. What other Basic compiler offers you this kind of flexibility?

64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 6883 SAM (Synchronous Address Multiplexer) in the Color Computer. It will fully utilize the 96K of address space available in the Color Computer (64K installed) during program Creation, Editing and Compilation. CBASIC has a special command for automatic 64K RAM control. When used in a program, it allows the user to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically switch the ROMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of 64K RAM like CBASIC.

ALL MACHINE LANGUAGE

CBASIC is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers. Because of this, CBASIC can edit and compile very large programs. Even using the Hi-Resolution 51 by 24 line display, it can work with about a 34K program, and the 80 column card versions can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs, CBASIC compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

THE FINISHED PRODUCT

Since CBASIC contains statements to support ALL of the I/O devices (Disk, Tape, Screen & Printer), Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. It generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC doesn't do this. ALL of its commands are compiled into a single machine language program that does not require any kind of Basic program to make it work.

COMPATIBILITY

You may be wondering about those statements we made earlier concerning 99% or 99.9% syntax compatibility. What does that other 1% consist of? The biggest part of that 1% has to do with string arrays and variables. CBASIC does not use a "String Pool" like Color Basic. It uses absolute memory addresses to locate string variables and arrays. This is why CBASIC's string processing is so fast, it also eliminates the time consuming "Garbage Collection" problem. When CBASIC allocates space for strings, it must know how much space to use for each string. When you Dimension a string variable in CBASIC, you must tell it how much space you want to save for each element. To Dimension an array of 40 strings, 64 characters each, you would DIM DA$(40,64). If a string is not dimensioned, CBASIC will automatically allocate 32 bytes for it. If you want a single string to have enough room for 200 characters you would DIM AX$(200). For string arrays, you would still access the element you want, the same as Color Basic, to get string #30 from the array DA$, you would still use DA$(30), the only real change is in the DIM statement. For undeclared string arrays of 10 elements or less, CBASIC will automatically reserve space for 10 (0-9) strings of 32 characters. In some other Color Basic compilers, you have to declare EVERY string variable used in the progrm in a DIM statement. And, to create an array of 40 strings with 64 characters each, you would have to DIM AD$(2560), and then to access string #30, you would have to multiply 30 × 64 and use a special variable name format or access it one character at a time. Not very compatible or convenient to use, and difficult at best.

CBASIC REQUIREMENTS

CBASIC requires a minimum of 32K RAM and at least one Disk drive. We strongly recommend that you have 64K. CBASIC is compatible with all versions of Color & Extended Basic and both Disk Basic V1.0 and V1.1. Programs compiled on either system will run on systems with different ROMs. CBASIC is NOT compatible with JDOS.

DOCUMENTATION

The Documentation provided with any program is very important to the user. This is especially true when you talk about a program as complete and complex as CBASIC. Even though CBASIC was designed to be the most User Friendly compiler on the market, we went to great lengths to provide a manual that is not only easy to use and understand, but comprehensive and complete enough for even the most sophisticated user. The manual included with CBASIC consists of approximately 120 pages of real information, not like some manuals that put just one or two short paragraphs on a page. If we did it that way, we could have easily created a three or four hundred page manual. The manual index breaks down each section of the manual and gives a 3 or 4 word description of each section and its items along with page numbers. The manual has three sections, the Editor, Compiler and Appendix. Each of these is divided into subsections, with Section and Subsection titles printed at the top of each page. If you want to, you could find the information you are looking for by simply flipping through the pages and scanning the Section titles on the top of the pages. The Manual itself is an 8½ by 11 Spiral Bound book with durable leather textured covers. Some of the reports we have had from CBASIC users describe the manual as being the Best program manual they have ever used.

COMPARE THE DIFFERENCE

CBASIC is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer. Compare CBASIC's features to what other compilers offer and you'll see the difference. When comparing CBASIC to other compilers, you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or string statements at all? How large of a program can you write? Can you compile a complex string like: MID$(RIGHT$(DA$(VAL(IN$),LEN(LE$)),3,3)? Can you use two character variable names for string & numeric variables, like Basic. Does it support all the Hi-Res graphics statements including PLAY, DRAW, GET and PUT, using the same syntax as Basic? Do you ever have to use a separate Basic program? Can you take complete Basic programs and compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

PRICE VERSUS PERFORMANCE

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 2 years writing and refining CBASIC, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC users already bought one or more of the other compilers on the market and have since discarded them. We even traded in a few of them. If you want a cheap compiler, we'll sell you one of those traded in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

ORDERING INFORMATION

To order CBASIC by mail, send check or money order in the amount of $149.00 plus $3.00 for shipping and handling to the address listed below.

To order by VISA, MASTERCARD or COD, call us at: (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST).

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Up To 55K
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9 Unlimited
Variable Length
Macro Key Buffers

BUFFER
EDITOR
Insert, Delete
Change or Add
To Buffer

"FEATURES"

- No Lost Information When Using Hi-Resolution Display On Line
- ASCII Compatible File Format
- Full Text Buffering
- Terminal Baud Rates 300 to 9600
- Automatic Word Wrap Eliminates Split Words
- Full/Half Duplex
- Automatic File Capture
- Programmable Word Length, Parity and Stop Bits
- Save and Load Text Buffer and Program Key Buffers to Tape or Disk
- 9 Hi-Resolution Display Formats, 28 to 255 x 24
- True Upper/lower Case Display
- Kill Graphics Option for an Extra 6K
- Supports Line Break
- Freeze Display and Review Information On Line
- Send Files Directly from Buffer or Disk
- Full Disk Support for Disk Version
- Send Control Codes from Keyboard
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- Display on Screen or Output Contents of Buffer to Printer
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Starship Falcon

Graphics Adventure Game

Six months ago a terrorist group demanded to be designated the rulers of Alpha Sigma III, under the threat of world starvation on the planet Earth. The Federation denied their demands, so they released a biological weapon which has destroyed all known edible plant species from throughout the known galaxy. To date no plant life has been able to survive on Earth. Recently, Federation undercover agents have reported a story told by a roving space trader, of a planet with abundant edible plant life. These plants have a reputation of being able to survive in all climates and in fact, are supposed to grow at an incredible rate. The Federation is desperate! If Earth's food source is not replaced soon, the Federation will have to evacuate all animal and Human life. Your mission is to go to the planet Zephyr and obtain the seed of these plants and return to Earth. Several Federation agents have been sent to obtain the seeds and none has returned! Can you get the seed and survive??? GOOD LUCK!

32K Disk $21.95

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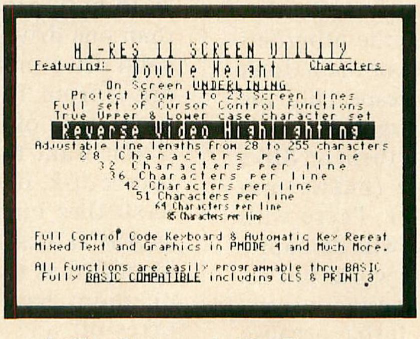

```
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Screen Enhancement Program Comparison Chart

PROGRAM FEATURES	HI-RES II NEW	HI-RES I OLD	BRAND X
Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Black	Buff/Black	Buff/Black
X.Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L keys	Clear key	No
16.32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program	Yes	Yes	Yes
RAM Required in addition to Screen RAM	2K	2K	2K
Program Price (Tape)	$24.95	$19.95	$29.95

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File Search allows you to store files on disk sorted by program type

Gathering Up Scattered Programs

By Pete Eichstaedt

When I found I had several disks with only a few programs on each, I wrote *File Search*, a disk file "search and copy" utility. It seemed that every time I had a new idea for a program, I used a new disk. Although I still use the programs on the varied disks, most of them don't require their own disk, especially the machine language programs. *File Search* allowed me to put them on disks sorted by program type (BASIC, machine language and data). Those with 16K and only one drive will be happy to know that the program works fine on your machine. If you have two drives, the program will work faster because you don't have to keep swapping disks.

Here's how the program works: On startup, the program asks which is the source drive and which is the destination. If you only have one drive, answer '0' to both prompts. If you have more than one drive, you can use any single valid drive in your system, or any two drives from '0' to '3'. Next, CoCo asks which type of file you want to copy or if you want to copy all files from the source disk. If you want to copy all your BASIC files, but have some of them saved as ASCII files, don't worry. They're still identified as BASIC programs. Once the questions have been answered, CoCo takes off and does the rest. The only interaction required is if only one drive is being used and a disk swap is required.

As the program runs, it reads the source disk directory, then checks the target disk directory to see if the program is there already. This saves the dreaded AE Errors common in copying. A message is displayed to show which file is being checked. You might see a

(Pete Eichstaedt lives in Downers Grove, Illinois, and is a field service engineer for Digital Transmission, Inc., a manufacturer of telecommunications systems. He has been using his Color Computer for work and play for the last five years. This is his second program published in THE RAINBOW.)

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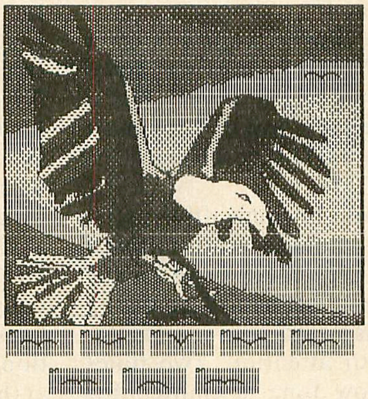

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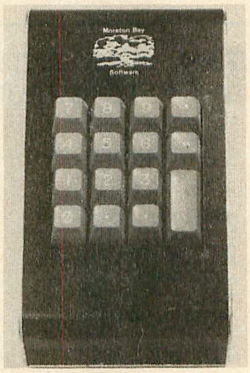

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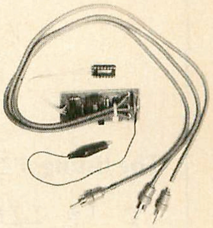

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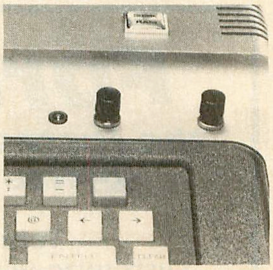

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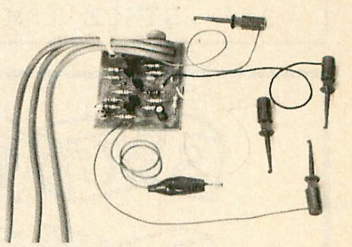
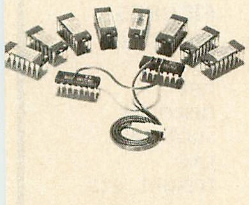


64K UPGRADES



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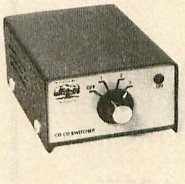

The CoCo Switcher allows you to hook up three peripherals to your RS-232 jack. Connect your modem, printer and any other RS-232 compatible peripheral to the CoCo Switcher. An LED on the CoCo Switcher shows if your computer is on or off at a glance, The LED flickers when transmitting or receiving data.

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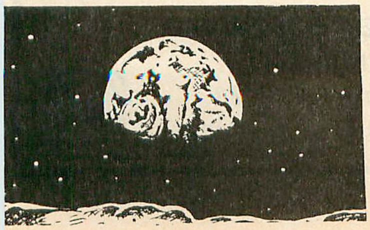

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comparison check being made on a file that doesn't look right. This is probably from a killed file, but don't worry — if the file isn't there, it can't be copied. If a file of the same name and format exists on both disks, it won't be copied, either. A message is displayed when a file is transferred.

When the copy is complete, CoCo asks if you want to transfer files from yet another disk. This keeps up as long as you answer "yes" and as long as the disk has room. If you run out of room while a copy is in progress, the program crashes with a DF Error — Disk Full. This is an acceptable concession when compared to having to type each `COPY` command manually.

When all the files are copied, answer "no" to the "search another disk" prompt. When you key in 'N', CoCo performs a cold start, just like on power up. If you just want to stop, change Line 1800 to `CLOSE:END`.

Of special note to single drive users: The program changes your selected single drive to the default drive for the system. As well, when disk changing prompts are displayed, a tone is generated to get your attention. Two tones are used: A low tone is emitted for required disk changes in the program proper; a higher tone is emitted when the BASIC system's `COPY` command is executed. If you don't change disks in the order requested, you get either an NE Error from the target disk not having the source program, or an AE Error from the source disk in the drive when CoCo is looking for the target disk.

If you don't get RAINBOW ON TAPE and have to type the program in manually, you can leave out all `REM`ark ('*) lines and lines 10 through 80. Suggestions and questions can be sent to me at the address at the start of the program listing. ☐

```
200 ......255
800 ......114
1390 .....130
2090 .....253
2600 ......15
END ......42
```

The listing: `FILESRCH`

```
0 '* LINES 0 THROUGH 90 AND ALL
REMARKS LINES CAN BE DELETED WIT
HOUT
1 '* AFFECTING PROGRAM OPERATION
2 '* SINCE I'M PROUD OF THE PROG
RAM, I'D RATHER YOU LEFT LINES
3 '* 10 THROUGH 80 ALONE.
5 CLS
10 PRINT "      ******************
******"
20 PRINT "      * FILESRCH - DISK
FILE *"
30 PRINT "      * COPY ROUTINE FOR
 THE *"
40 PRINT "      * COLOR COMPUTER W
/16K *"
50 PRINT "      * BY PETE EICHSTAE
```

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```
DT     *"
60 PRINT "      * APT D-308
     *"
65 PRINT "      * 2045 PRENTISS DR
IVE  *"
70 PRINT "      * DOWNERS GROVE, I
L    *"
75 PRINT "      *           605
16   *"
80 PRINT "      ******************
******"
90 '* CLEAR AND ALLOCATE STRING
SPACE
95 GOTO 3600
100 CLEAR 1000:DIM PG$(72):DIM P
P$(72)
200 INPUT "WHICH IS INPUT DRIVE"
;ID$:ID = VAL(ID$):IF ID <0 OR I
D > 3 GOTO 2500
300 INPUT "WHICH IS OUTPUT DRIVE
";OD$:OD = VAL(OD$):IF OD <0 OR
OD > 3 GOTO 2500
500 PRINT "WHICH FILE TYPE SOULD
 BE SOUGHT":PRINT "  0 = BASIC P
ROGRAM":PRINT "  1 = BASIC DATA
FILE":PRINT "  2 = MACHINE LANGU
AGE PROGRAM":PRINT "  3 = TEXT E
DITOR SOURCE FILE"
510 LINE INPUT "  4 = ALL ";FT$:
:IF FT$ <"0" OR FT$ >"4" GOTO 50
0
520 FT = VAL(FT$)
550 IF ID <> OD THEN SOUND 50,3:
PRINT "PUT SOURCE DISK IN DRIVE"
;ID:INPUT "AND PRESS <ENTER>";Z$
590 '* EACH DISK HAS 9 SECTORS F
OR RECORD ENTRIES
600 FOR S = 3 TO 11
690 '* CLEAR THE PROGRAM RECORD
COUNTER
700 PG = 0:IF ID = OD THEN CLS:S
OUND 50,3:PRINT "PUT SOURCE DISK
 IN DRIVE";ID:LINE INPUT "AND PR
ESS 'ENTER'";Z$
790 '* READ THE DIRECTORY SECTOR
S
800 DSKI$ ID, 17, S, DR$(1),DR$(
2)
890 '* IDENTIFY THE STRING TO MA
NIPULATE
900 FOR H = 1 TO 2
990 '* EACH RECORD HAS 32 BYTES
1000 FOR EN = 1 TO 128 STEP 32
1090 '* INCREMENT THE COUNTER
1100 PG = PG+1
1190 '* WE ONLY NEED THE FIRST 1
```

Max Edit

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```
2 BYTES OF EACH RECORD
1195 '* BYTES 1-8 HAVE THE NAME,
 9-11 THE EXTENSION, AND 12 HAS
THE FILE TYPE
1200 PG$(PG) = MID$(DR$(H),EN,12
)
1210 '* IF THE FIRST BYTE IS $0
THE RECORD WAS KILLED, GET THE N
EXT RECORD
1250 '* IF THE FIRST BYTE IS $FF
 THERE ARE NO MORE ENTRIES (UNLE
SS YOU HAVE SOME WEIRD PROGRAM N
AMES)
1260 IF LEFT$(PG$(PG),1) = CHR$(
255) GOTO 1500
1290 '* CHECK THE FILE TYPE.  IF
 IT MATCHES, PROCEED, ELSE GET N
EXT RECORD
1300 IF RIGHT$(PG$(PG),1) = CHR$
(FT) THEN GOSUB 1900 ELSE IF FT=
4 GOSUB 1900
1390 '* GET NEXT ENTRY, CURRENT
STRING, SECTOR
1400 NEXT EN, H, S
1490 '* TRY AGAIN?
1500 CLS
1600 INPUT "SEARCH ANOTHER DISK"
;YN$
1700 IF LEFT$(YN$,1) = "Y" OR LE
FT$(YN$,1) = "y" THEN CLS:GOTO 2
00
1790 '* CLOSE OPENED FILES AND P
ERFORM A COLD START.  REPLACE WI
TH "CLOSE:END" TO STOP COLD STAR
T
1800 CLOSE:POKE 113,0:EXEC &HA02
7
1890 '* PUT A "." BETWEEN THE NA
ME AND EXTENSION (SAME AS A "/")
1900 OP$ = LEFT$(PG$(PG),8)+"."+
MID$(PG$(PG),9,3)
1910 IF G<=1 THEN GOTO 2600 ELSE
 GOTO 2630
1990 '* IF YOU'RE ONLY USEING ON
E DRIVE, MAKE SURE IT'S THE DEFA
ULT DRIVE
2000 IF ID = OD THEN DRIVE ID
2030 PRINT:PRINT "COPYING ";OP$;
" TO DRIVE";OD
2050 IF LEFT$(PG$(PG),1) = CHR$(
0) GOTO 2300
2090 '* IF YOU'RE USING TWO DRIV
ES, COPY FROM THE INPUT DRIVE AN
D TO THE OUTPUT DRIVE
2100 IF ID <> OD THEN COPY OP$+"
:"+RIGHT$(ID$,1) TO OP$+":"+RIGH
T$(OD$,1) ELSE COPY OP$
2190 '* IF YOU'RE USING ONLY ONE
 DRIVE, PROMPT DISK SWITCH
2200 IF ID = OD AND PG <= 1 THEN
 CLS:PRINT "INSERT SOURCE DISKET
TE AND      PRESS 'ENTER'";:SOUN
D50,3:LINE INPUT NX$
2290 '* GET THE NEXT RECORD
2300 RETURN
2400 END
2490 '* IF YOU MESS UP, COCO TEL
LS YOU AND RESTARTS
2500 CLS 4:SOUND 100,1:SOUND 150
,1:SOUND 100,1:PRINT @ 232, "INV
ALID DRIVE!";:FOR X = 1 TO 1000:
NEXT:CLS:GOTO 200
2550 '* SHORTSTOP OVERFLOW INTO
THE NEXT ROUTINE
2560 '* IF IT GETS HERE IT DOESN
'T BELONG ... END!
2590 END
2595 '* CHECK FOR SINGLE DRIVE O
PERATION
2600 IF ID = OD THEN CLS:SOUND 5
0,1:PRINT "INSERT DESTINATION DI
SKETTE IN  DRIVE";OD;:LINE INPUT
 "AND PRESS 'ENTER'";Z$
2620 '* SEE IF FILE ALREADY EXIS
TS
2630 PRINT:PRINT "CHECKING DESTI
NATION DISKETTE":PRINT "FOR ";OP
$:PRINT "TO PREVENT <AE ERROR>"
2650 PP=0: FOR SS = 3 TO 11
2700 DSKI$ OD,17,SS,CK$(1),CK$(2
)
2800 FOR HH = 1 TO 2
2900 FOR EE = 1 TO 128 STEP 32
3000 PP = PP +1
3100 PP$(PP) = MID$(CK$(HH),EE,1
2)
3200 IF PP$(PP) = PG$(PG) THEN R
ETURN
3225 IF LEFT$(PP$(PP),1) = CHR$(
255) GOTO 3350
3250 PP$(PP) = ""
3300 NEXT EE,HH,SS
3330 '* IF YOU GET THIS FAR, THE
 FILE MUST BE COPIED
3340 '* CHECK FOR SINGLE DISK OP
ERATION, THEN CALL THE COPY ROUT
INE
3350 IF ID = OD THEN CLS:SOUND 5
0,1:PRINT "INSERT SOURCE DISK IN
 DRIVE";ID:LINE INPUT "AND PRESS
 'ENTER'";Z$
3400 GOTO 2000
3450 '* SHORTSTOP RUNAWAY OPERAT
ION
3500 END
3550 '* CLEAR AS MUCH MEMORY AS
YOU CAN THROUGH BASIC
3600 PCLEAR 1:GOTO 100
```

The HJL-57 Keyboard

Now available for all models, including CoCo 2.

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If you've been thinking about spending good money on a new keyboard for your Color Computer, why not get a good keyboard for your money?

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The last of a four-part series on operating with this BBS software

CoBBS:

How to Modify the Program to Use the CoCo 'Serial Port'

By Richard Duncan

Written for use with the RS-232 Pak, *CoBBS* takes advantage of it being a true serial port. The "serial port" on the back of the CoCo was designed as a printer port, but through the miracle of software can be used as a communications port (but still not a true RS-232 port, just voltage compatible). *CoBBS* can be modified to use the serial port, but it loses a lot of its features, including advanced key input, no pausing or stopping while a message or file is being displayed, no uploads, no 1200 Baud, slower operation and awkward termination of a call.

If I sound pessimistic about serial operation using the serial printer port, I am! We will discuss briefly some of the modifications required to convert *CoBBS* and its operation. You will have to do the installation depending on your needs. I strongly suggest obtaining an RS-232 Pak if you are serious about running this BBS software, but for those who want to experiment . . . here we go.

Changing *CoBBS* over to the serial port requires modification of the serial driver and all the BASIC routines. The main difference is that the serial version pauses anytime it is polled and waits for a character, where the Pak returns a `CHR$(0)` and returns to BASIC. Throughout the programs, the system jumps to the single key input routine of the driver to strip any extra character waiting to be received, making sure no extraneous character is in the buffer.

The following lines of *USER/SYS* have the statement `EXEC4314`, or `EXEC&H10DA`, in them and should be removed: 40, 68, 70, 150, 180, D266, 345, D1205, 1225 and D7035. If there is a 'D' preceding the number, delete the whole line and replace it with a `REM` statement. The following lines in *COBBS/SYS* to change are: 410, 440, 960, D975, 1005, 1270, 1345, 1420, 1465, 2085, 2410, D7050 and 7057.

The carrier detect routine must also be changed. The way to do this is to check the CD flag set via the serial port. The port should first be reset by the command `K=PEEK(&HFF20)`. Then, by monitoring the location of $FF21 for a change in state, you will know when a carrier is coming in. The command `CD=PEEK(&HFF21)` checks the flag. If the value of 'K' is greater than 100, the system has detected a carrier. After detecting a carrier, again issue the command `K=PEEK(&HFF20)`. From this point on the value of 'K' should be less than 100. If not, it means the last user has dropped his carrier, this is a new caller and the system needs to be rebooted. The carrier detect subroutine for *USER/SYS* should read: `9700 '-CD CHECK-9705 IFPEEK(&HFF21)=`

(Richard Duncan is a broadcast technician for WMC-TV in Memphis, Tennessee. He is active in amateur radio [WD5B] and especially interested in Packet communications. Richard lives in West Memphis, Arkansas.)

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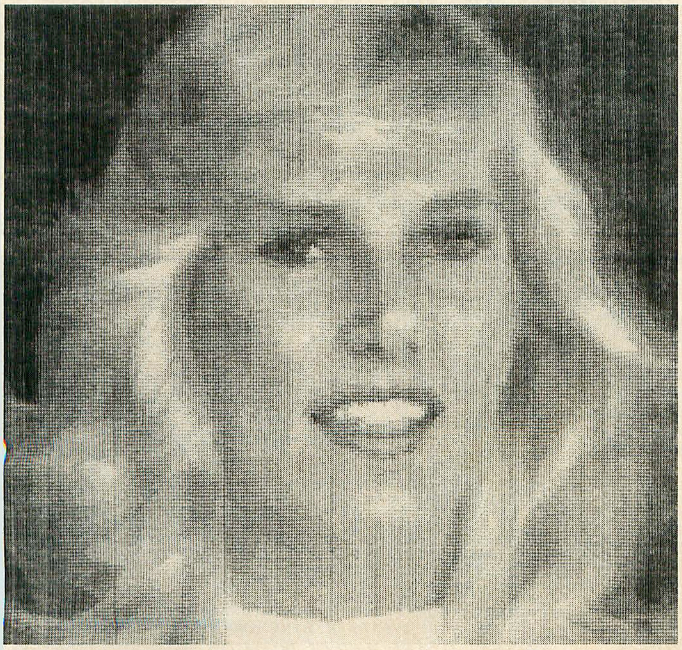

`180 THEN CLOSE:RUN 9710 RETURN`. In *COBBS/SYS* replace the `RUN` with `LOAD"USER/SYS",R`.

Next, you must devise a way to hang up your modem when you want to terminate a call. This might be done with the "+++" and "ATH" with the Hayes modem, or through use of the cassette relay and the `MOTOR ON/OFF` command. This is done in the 9800's subroutine.

The listing provided is used to load in *COTERM/BIN* for the RS-232 Pak, convert it for the serial port and save it back out *under the same name*. You cannot use the C/R modification with the serial port version. It is hard to modify a big program to be used a different way from the way it was originally written.

With some effort and patience you will be able to get a basic version of *CoBBS* running with the printer port. If you want the Pak version along with a documentation disk, send $25 to me at 2504 N. Gathings Drive, West Memphis, AR 72301. □

The listing: `LOADER`

```
10 'THIS ROUTINE WILL LOAD IN
20 'COTERM/BIN, MODIFY IT FOR
30 'THE SERIAL PORT AND SAVE
40 'THE MODIFIED VERSION OUT TO
50 'DISK.  this routine will
60 'overwrite the original versi
on!
70 LOADM"COTERM"
80 A=4240
90 READ D$:IF D$="END" THEN 110
100 POKE A,VAL(D$):A=A+1:GOTO90
110 SAVEM"COTERM/BIN",&H0E00,&H1
2BF,&H1090
120 CLS:PRINT@260,"COTERM/BIN MO
DIFIED":END
130 DATA 67,48,141,0,81,188,1,10
4,39,50
140 DATA 182,1,103,167,141,0,218
,190,1,104
150 DATA 175,141,0,212,182,1,106
,167,141,0
160 DATA 207,190,1,107,175,141,0
,201,134,126
170 DATA 183,1,106,183,1,103,48,
141,0,36
180 DATA 191,1,104,48,141,0,4,19
1,1,107
190 DATA 57,15,112,13,111,16,38,
0,169,127
200 DATA 255,64,50,98,141,44,129
,3,38,2
210 DATA 134,42,183,17,129,57,52
,2,18,18
220 DATA 18,18,18,18,18,18,18,18
,150,111
230 DATA 53,2,16,38,0,129,141,62
,129,13
240 DATA 38,6,134,10,141,54,134,
13,32,115
250 DATA 52,21,26,80,173,159,160
,0,39,2
260 DATA 32,36,182,255,34,71,37,
242,141,84
270 DATA 182,255,34,71,37,242,79
,52,2,198
280 DATA 7,141,69,182,255,34,18,
71,102,96
290 DATA 90,38,244,141,55,53,2,6
8,53,149
300 DATA 52,23,26,80,246,255,33,
193,180,38
310 DATA 2,32,31,127,255,32,141,
34,52,2
320 DATA 198,8,100,96,73,73,183,
255,32,18
330 DATA 141,20,90,38,243,134,2,
183,255,32
340 DATA 141,8,50,97,53,151,141,
0,141,0
350 DATA 141,0,141,0,174,141,0,5
,48,31
360 DATA 38,252,57,0,182,126,203
,74,126,197
370 DATA 143,13
380 DATA END
```

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CoCocad Modification

"CoCocad: The Schematic Scoundrel" (October 1985, Page 130): Peter Kerckhoff writes to tell us that some other printers besides the Gemini-10X can be used with this program.

First of all, there is a rather roundabout method that works with any printer that can be used to make screen dumps of regular CoCo graphics, if you have a screen dump program for your printer. Delete Line 1990 from the main program. When you request a printout, *CoCocad* will now save nine screen files on the disk. Each has the name *PRT.PGn*; 'n' is the page number (so *PRT.PG3* would be the third page).

Now load in your screen print program and type the command `PMODE 4,1:SCREEN1,1` and press ENTER. Then, for each file type `LOADM"PRT.PGn"`, and after the file is loaded activate the screen print routine. Once you have printed all nine pictures, cut them out and tape them together.

Peter also included a new version of the *Cadprint* printer driver that is designed for the Tandy/Radio Shack DMP series printers. Here it is:

The listing: CADPRINT

```
10 'CADPRINT VR1.0 BY P.KERCKHOF
F 4335 HENDRIX WAY SAN JOSE CA -
 1985 RAINBOW MAG (OCT)
20 'MODIFIED FOR USE WITH RADIO
SHACK DMP-120 PRINTER BY DAVISSO
N ON 10/15/85
30 CLEAR100,&H379A:CLS:PRINT"cad
print RUNNING":FORX=&H379B TO &H
37FA:READ A:POKEX,A:NEXTX
40 POKE150,41 '1200 BAUD
50 PRINT#-2,CHR$(18)
60 FOR PG=0TO8STEP3
70 LOADM"PRT.PG"+RIGHT$(STR$(PG)
,1),&H2A00
80 LOADM"PRT.PG"+RIGHT$(STR$(PG+
1),1),&H4200
90 LOADM"PRT.PG"+RIGHT$(STR$(PG+
2),1),&H5A00
100 EXEC&H379B
110 KILL"PRT.PG"+RIGHT$(STR$(PG)
,1):KILL"PRT.PG"+RIGHT$(STR$(PG+
1),1):KILL"PRT.PG"+RIGHT$(STR$(P
G+2),1):NEXT PG
120 PRINT:PRINT"DONE.":PRINT#-2,
CHR$(30):STOP
130 DATA 134,254,151,111,134,1,1
42,126,224,48,134,52,2,141,38,53
,2,142,102,224,48,134,52,2,141,2
7,53,2,142,78,224,48,134,52,2,14
1,16,134,13,173,159,160,2,53,2,7
6,129,31,38,212,15,111,57
140 DATA 198,156,52,20,230,132,1
6,142,0,8,16,191,55,249,88,70,12
2,55,250,16,190,55,249,38,245,67
,138,128,173,159,160,2,53,20,48,
136,224,90,38,218,57,0,0
```

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PASSING PICTURES — A new programming standard now allows pictures drawn on one microcomputer to be transferred to a different microcomputer for editing or printing.

The new standard is known as PIX — for Picture Exchange.

Currently, PIX conversion programs exist for the TRS-80, IBM PC, Apple Macintosh, Commodore 64, Atari XL, KayPro and Televideo TPC-I computers and the Epson, Tally and Okidata printers. All programs are in the public domain.

For information on how to obtain these programs, send a legal-size self-addressed stamped envelope to: *Telecommunications Users Group, P.O. Box 45254, Seattle, WA 98145-0254.*

* * *

COMPUTER FAIR — ECCO, the Educational Computer Consortium of Ohio, is issuing a call for presenters on all topics relating to the integration of computers into the curriculum, including research papers, workshops, projects and panels. All proposals are due April 1, 1986. Send proposals to: ECCO's Sixth Annual Educational Computer Fair, "The Computer Connections: Using the Computer in the Classroom," October 9 and 10, 1986, Cleveland, Ohio.

For further information contact *Alice Fredman, ECCO, 1123 S.O.M. Center Road, 44124, or call (216) 461-0800.*

* * *

AIDING THE DISABLED — Plans were announced today for the "Western Regional Computer Technology For The Handicapped" conference to be held at the Los Angeles Convention Center April 9-13, 1986. Sponsored by *Closing The Gap*, the conference will be held in conjunction with Dick Wooten's Eighth Annual "Abilities Expo," the largest exhibit in the nation devoted exclusively to meeting the needs of persons with disabilities.

"There is a wealth of information on just how computers can help the handicapped and we hope to bring it all together with the Abilities Expo," says Dolores Hagen, *Closing the Gap* publisher. This combined effort will provide intensive training workshops, a sharing conference, and more than 200 exhibits in the largest public show of equipment, services, employers, organizations and publications for the disabled in the U.S.

"Adding computer technology to an already established exposition of products will serve to expand awareness of technology's impact on the lives of all disabled individuals," Hagen added. "Our hope is to provide intensive microcomputer training as well as networking opportunities in this highly specialized field."

For more information contact: *Closing The Gap, P.O. Box 68, Henderson, MN 56044, (612) 248-3294 or (507) 345-8233.*

* * *

GUIDE FOR FREELANCERS — Despite the "gloom and doom" reports on the future of the software industry, the good news is that the market is still growing, now at a healthy, instead of an explosive rate. And the market for freelance programmers is better than ever, reports Brad McGehee, editor of the annual directory *Programmer's Market: Where & How to Sell Your Software.*

To compile the 1986 edition of *Programmer's Market*, questionnaires were sent to over 6,000 software publishers asking them if they published software written by freelance programmers. Over 700 software publishers confirmed that they did solicit software submissions from freelance programmers and these questionnaires provided the basis for the directory listings in the book.

There are two lists resulting from the survey that will interest anyone wanting to write and sell freelance software. The first list is composed of software categories that are solicited by software publishers who publish freelance programs. The second list is of the Top 10 brands of computers that software publishers want freelancers to write software for.

For information, see the 1986 edition of *Programmer's Market, edited by Brad M. McGehee, Writer's Digest Books, $16.95.*

* * *

HEADLINES OF THE FUTURE — Nicholas Negroponte, director of MIT's New Media Laboratory, predicted the demise of traditional newspapers before an audience of newspaper publishers. According to Negroponte, newspapers will soon be replaced by home computers, scanning news services, other news sources and equipped with a profile of the user, giving the user/reader a personalized newspaper.

"A complete redefinition of the concept of newsworthiness; for instance a piece of electronic mail from my son at boarding school as the headline, is one way of dealing with the exploding mass of information. We can't do it the old way any more," said Negroponte. "We must have other agents, which happen to be computers . . . reading for us."

* * *

HOW I SPENT MY SUMMER VACATION — Those ubiquitous essays will never be the same, at least not for youngsters attending the 1986 National Computer Camps. Camp locations are: Westminster Prep School, Hartford, Ct., Oglethorpe University, Atlanta, Ga., and Ursuline College, Cleveland, Ohio.

From June 22 to August 1, 1986, the coed campers, ages 8-18, may sign up for one or more weeks and enjoy small group instruction on Radio Shack, Apple and IBM computers for ample "hands-on" experience.

National Computer Camps is now in its ninth year, and is for youngsters of all levels of experience, including those with no experience whatsoever.

For further information, contact *Michael Zabinski, Ph.D., (203) 795-9667, or write to National Computer Camps, P.O. Box 585, Orange, CT 06477.*

* * *

HARDWARE AGAINST HARD FACTS — WMD Micro Distributors Inc., one of the ten largest distributors of computer hardware in the U.S., will provide its 10,000-plus customer and distributor lists as a resource to the National Center for Missing and Exploited Children for regional and nationwide search programs.

WMD is spearheading a move to form a high-tech network for missing children comprised of Southern California companies in the computer industry that would use their vast communications networks to help distribute and gather information on missing children.

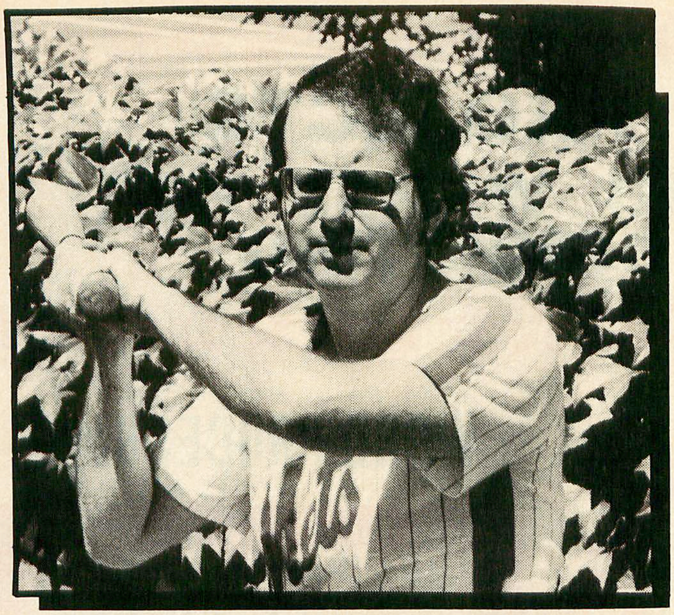
William Orr, WMD National Director of Systems Marketing said, "It is a conservative guess that high-tech companies in Southern California reach millions of people a month, many of whom could play an important role in locating children across the country." Orr said that he hopes the network will be expanded to national proportions.

WMD uses special messages on its postage machines as an additional method of asking people to look out for useful information on missing children.

Orr said, "It takes a very small amount of time to insert the missing children sheets into WMD's mailings," noting that envelopes including the missing children sheets seem to get more attention from employees.

WMD has asked that companies interested in forming a high-tech network for missing children to contact *William Orr at WMD Micro Distributors, 17351 Murphy Avenue, Irvine, CA 92714, (714) 660-1679.*

* * *



– CoCo Legends Collection – Bob "Whiffle" Rosen

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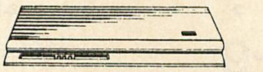

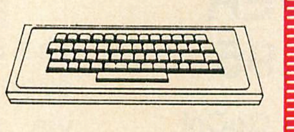

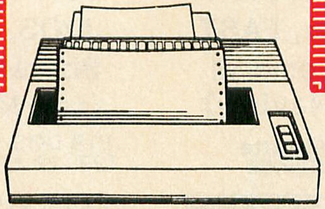

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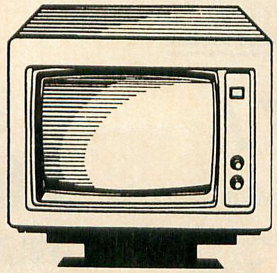

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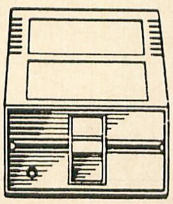

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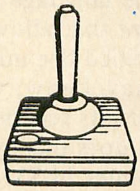

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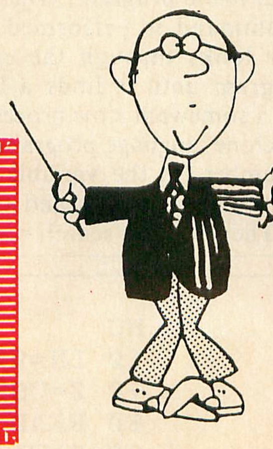

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PROGRAMMING UTILITY

32K
ECB

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Quick Restore

By John Galus

If you write BASIC programs that use a lot of data or long tables, such as in an Adventure game, you know how long it takes a program to search for a particular data item. Here is a short machine language routine called *Quick Restore* that allows you to restore to a specified line number.

(John Galus, a free-lance programmer/writer, lives in Lackawanna, New York. He and his brother, Mike, enjoy working with the Color Computer. He has an associate degree in data processing and is interested in playing guitar, amateur astronomy and Dungeon and Dragon games.)

As you may know, the RESTORE command permits repetitive use of the same data. It does this by resetting the data item pointer in $33 to the beginning of your BASIC program. Whenever a READ command is performed, the interpreter looks through the entire BASIC program until it finds a DATA statement, a somewhat slow process.

This machine language program gets the line number (in the variable LN) passed by the USR function and stores it in $2B. Then the line search routine is called at $AD01. If this line is found, the address pointed to by Register X is bumped back by one and stored in $33. If the line number is not found, a RESTORE is performed to the next higher numbered line in your program.

I have included a short program to illustrate the usefulness of this routine. It is written for a 32K Extended BASIC computer, but it is relocatable and will work on any size machine you have.

(Any questions you have about this program may be sent to John at 55 Wilkesbarre Avenue, Lackawanna, NY 14218, phone 716-823-3144. Please include an SASE when writing.) ☐

The listing: RESTORE

```
1 'QUICK RESTORE
2 'JOHN GALUS
3 '55 WILKESBARRE AVENUE
4 'LACKAWANNA, NEW YORK 14218
10 CLEAR10,&H7FEF
20 CLS:X=&H7FF0:DEFUSR0=X
30 READ A:IF A=-99 THEN 50
40 POKE X,A:X=X+1:GOTO30
50 INPUT"ENTER ROOM NUMBER 1-4";
NU
60 LN=90+NU*10
70 Z=USR0(LN)
80 READ A$:PRINTA$:GOTO50
90 DATA 189,179,237,221,43,189,1
73,1,158,71,48,31,159,51,57,-99
100 DATA ROOM ONE
110 DATA ROOM TWO
120 DATA ROOM THREE
130 DATA ROOM FOUR
```

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RENUM
with a Twist

By Fredric M. Haberer

Ordinarily, using `RENUM` is simple and straightforward: You have been working on a BASIC program for some time, and additions and revisions have filled all the gaps between line numbers, yet another line needs to be inserted. A little work space at the beginning of the program would be nice, so your new start line becomes 100. You want to renumber from the start, and the present first line is '7'. Line increments of 10 keep things simple and leave room for new lines. So, you type `RENUM 100,7,10,` and ENTER.

If the program is just a few lines long, OK appears on the screen. If the program contains 300 lines, the processing takes a few seconds. In either case, the lines are renumbered. And, significantly, every `GOSUB` and `GOTO` is renumbered to its new target line number.

There's nothing so unusual about that, but the CoCo's method of renumbering `GOSUB`s and `GOTO`s makes possible quite a different use for the `RENUM` function. Suppose you have been developing a program for some time. It has numerous branches; even the branches have branches. As you revise, reorganize and consolidate program lines, you lose track of the `GOSUB`s, the `GOTO`s and their target lines. As you run the program, UL (Undefined Line) Errors come up in frustrating profusion. `RENUM` is the answer to your problem — if you employ a special twist.

When you enter `RENUM 100,7,10,` as in the example, the CoCo attempts to reconcile all `GOSUB`s and `GOTO`s with their target lines. If, in editing, you have deleted target lines (`REM` statements, for example, which never should have been `GOSUB` targets in the first place), a statement such as the following appears on the screen: UL 3766 in 550. Roughly translated, this means: "In Line 550, there is an instruction to go to Line 3766, but no such line is in your program."

Now you know that newly designated Line 550 contains a `GOSUB` or `GOTO` targeted to Line 3766. Unfortunately, Line 3766 did not exist in the first place, and you haven't the slightest idea where it would be in the newly numbered sequence. If the program is a long one, you're better off reloading the original program and starting over. If only the CoCo could have identified those ULs before renumbering, you would have been saved hours of tracing and decoding.

As it turns out, the CoCo can do just that, but you will have to do some minor subterfuge. Just ask the CoCo to do the impossible: tell it to renumber using a starting line number that doesn't exist — a line beyond the range of your program. For example, your program starts on Line 10 and ends on Line 15277. You tell CoCo to renumber starting at Line 16000; enter `RENUM 16000,16000,1.` (It's important that both the start line and the new first line be numbered higher than the highest line in the program. Otherwise, you'll get an FC Error.)

The CoCo first searches for line numbers that can't be reconciled, then attempts to renumber. There is no Line 16000 from which to start renumbering. Therefore, it gives up, dutifully lists the unreconciled lines and says, "OK." There's no error message, no cough and no sputter. CoCo has done its best to renumber as asked, and has instantly done a heap of work for you. On your screen appears the number of each line containing an unreconciled `GOSUB` or `GOTO` and the number of its target line.

Your original line numbering remains intact. The tedious job of finding the errors is done. You now know which lines to list and edit. After you've made your corrections, if you still want to renumber, you may go ahead and do it.

You might not have wanted to renumber in the first place. In this case, renumbering is a debugging tool that locates your UL problems, and keeps its "fingers" off of your numbering system.

Of course, this procedure cannot identify incorrect target lines if the lines actually exist. However, it is a real headache-reliever in the case of a long program with holes in it.

(Fred Haberer teaches junior and senior high school English at WACO High School in Olds, Iowa.)

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— Exhibits open from 11 a.m. to 4 p.m.

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To make it easier for you to participate, we schedule RAINBOWfests in three parts of the country. If you missed the fun in Princeton, N.J., why don't you make plans now to join us in Palo Alto, Calif.? For members of the family who don't share your affinity for CoCo, *you'll* be comfortable knowing that RAINBOWfest is located in an area with many other attractions.

The Hyatt Hotels - Palo Alto offer special rates ($71, single or double room) for RAINBOWfest. The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime-only show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. There will be no exhibition hours or seminars Saturday evening. On Sunday, the OS-9 Users Group will host a breakfast at 9 a.m. (separate tickets required). The exhibit hall opens at 11 a.m. and closes at 4 p.m.

William D. Gattis, Vice President of the Education Division of Radio Shack, will keynote the highly popular CoCo Community Breakfast. These traditional gatherings allow you to stay abreast of significant CoCo Community happenings in an intimate setting.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

Come to RAINBOWfest!

PCMfest Your admission to RAINBOWfest also entitles you to visit PCMfest! It's a show focusing on Tandy's new generation of computers — the Tandy 1000, 1200, 2000 and 3000 MS-DOS computers, and the Tandy 100, 200 and 600 portables.

PCMfest is sponsored by our sister publication, PCM, *The Personal Computer Magazine for Tandy Computer Users.* The show will be in the same location as RAINBOWfest and the exhibit hours will be exactly the same. If you use one of the newer Tandy computers, don't miss it.

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Bill Barden
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Assembly Languages

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CoCo Community Breakfast

William D. Gattis
Vice President of the Education Division of Radio Shack will be the keynote speaker of the CoCo Community Breakfast, Saturday.

Join us at future RAINBOWfests!

RAINBOWfest - Chicago
Dates: May 23-25, 1986
Hotel: Hyatt Regency, Woodfield
Rooms: $60 per night, single or double
Advance Ticket Deadline: May 16, 1986

RAINBOWfest - Princeton, N.J.
Dates: Oct. 17-19, 1986
Hotel: Hyatt Regency, Princeton
Rooms: $79 per night, single or double
Advance Ticket Deadline: Oct. 10, 1986

FREE T-Shirt to first five ticket orders received from each state.
FREE RAINBOW poster for first 500 ticket orders received.

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City _____ State _____
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☐ VISA ☐ MasterCard ☐ American Express
Account Number _____
Exp. Date _____
Signature _____

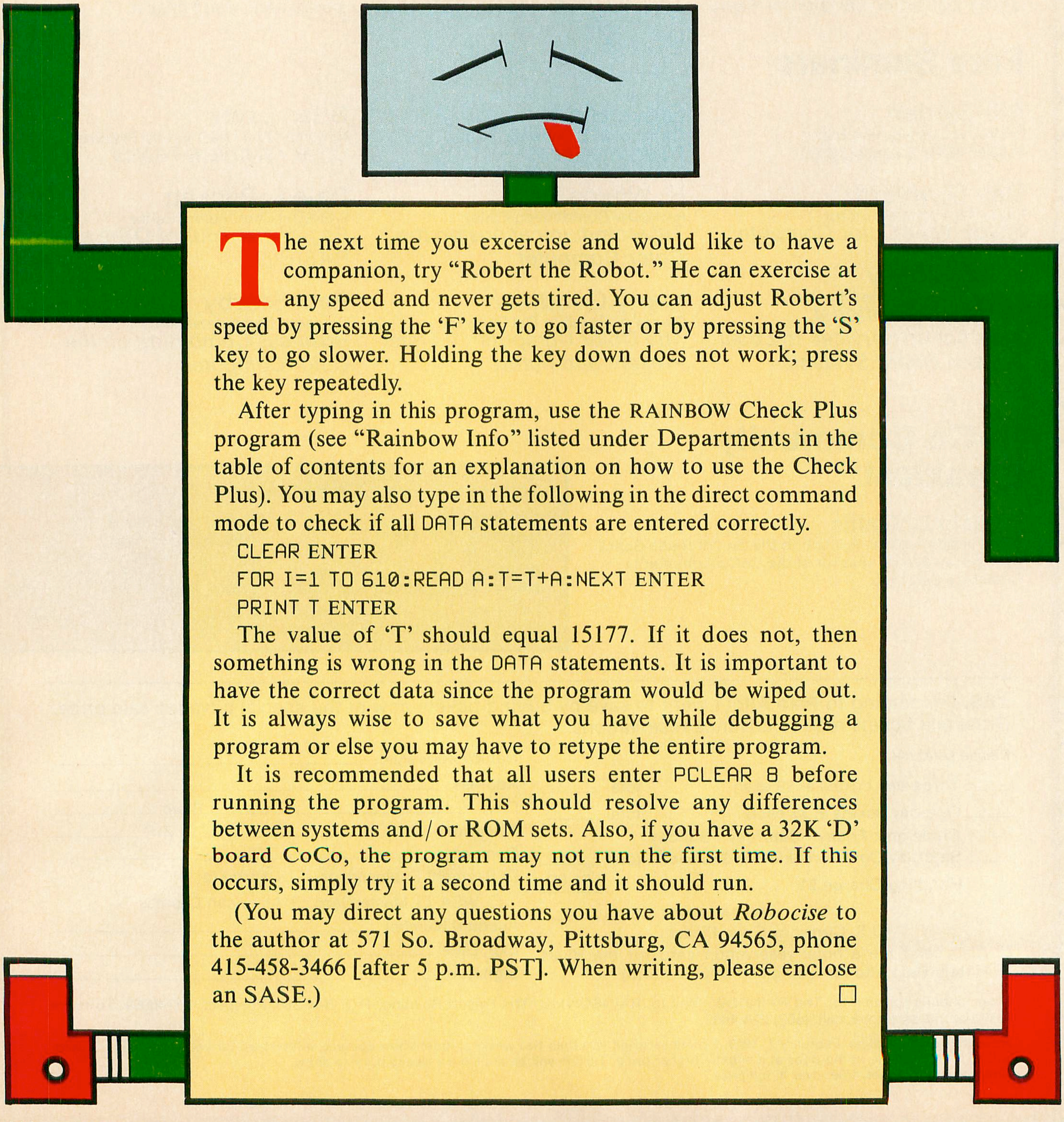
Make checks payable to: The RAINBOW. Mail to: RAINBOWfest, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, call: (502) 228-4492.

Advance ticket deadline: February 7, 1986. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show. Children 4 and under, free; over 4, full price.

Move over Richard Simmons and Jane Fonda! Now you can exercise with CoCo at a pace that suits your style

Robocise

By W.J. Moore



The next time you excercise and would like to have a companion, try "Robert the Robot." He can exercise at any speed and never gets tired. You can adjust Robert's speed by pressing the 'F' key to go faster or by pressing the 'S' key to go slower. Holding the key down does not work; press the key repeatedly.

After typing in this program, use the RAINBOW Check Plus program (see "Rainbow Info" listed under Departments in the table of contents for an explanation on how to use the Check Plus). You may also type in the following in the direct command mode to check if all DATA statements are entered correctly.

```
CLEAR ENTER
FOR I=1 TO 610:READ A:T=T+A:NEXT ENTER
PRINT T ENTER
```

The value of 'T' should equal 15177. If it does not, then something is wrong in the DATA statements. It is important to have the correct data since the program would be wiped out. It is always wise to save what you have while debugging a program or else you may have to retype the entire program.

It is recommended that all users enter PCLEAR 8 before running the program. This should resolve any differences between systems and/or ROM sets. Also, if you have a 32K 'D' board CoCo, the program may not run the first time. If this occurs, simply try it a second time and it should run.

(You may direct any questions you have about *Robocise* to the author at 571 So. Broadway, Pittsburg, CA 94565, phone 415-458-3466 [after 5 p.m. PST]. When writing, please enclose an SASE.) ☐

```
240 .......49
500 ......139
710 ......170
890 ......129
END .....173
```

The listing: ROBOCISE

```
10 REM ROBOCISE BY W.J. MOORE -
PITTSBURG CALF
20 '  DISPLAY PICTURE
30 PCLEAR8
40 L=PEEK(186)*256+PEEK(187)
50 PMODE4:POKE179,32:PCLS
60 CLS:PRINT@264,"BUILDING A ROB
OT"
70 PRINT@327,"ROBERT IS HIS NAME
"
80 N=L+19*32:GOSUB630
90 N=L+21*32:GOSUB630
100 N=L+24*32:GOSUB630
110 N=L+28*32:GOSUB630
120 N=L+33*32:GOSUB630
130 N=L+39*32:GOSUB630
140 N=L+46*32:GOSUB630
150 C=0:X=L+11:N=X:GOSUB490
160 PCOPY1TO3
170 C=0:X=L+7:N=X:GOSUB490
180 PCOPY1TO4
190 PCOPY3TO1
200 C=0:X=L+16:N=X:GOSUB490
210 PCOPY1TO5
220 C=0:X=L+1924:N=X:GOSUB490
230 A$=" PRESS:  F=FASTER S=SLOWE
R "
240 FORI=1TO LEN(A$):T$=MID$(A$,
I,1):T=ASC(T$)
250 IF T<64 THEN T=T+64:MID$(A$,
I,1)=CHR$(T)
260 NEXT
270 C=0:N=L+2884
280 FORI=1TO LEN(A$):T=ASC(MID$(
A$,I,1))
290 FOR C=0TO5:POKEN+C*32,T:NEXT
300 N=N+1
310 NEXT
320 L=PEEK(186)/2:A=65478
330 FORP=0TO6:N=INT(2^P)
340 IF L AND N THEN POKE A+P*2+1
,0 ELSE POKE A+P*2,0
350 NEXT
360 N=PEEK(65314):POKE65314,(N A
ND 7)
370 POKE65472,0:POKE65474,0:POKE
65477,0
380 X=50:PLAY"O1T20"
390 PCOPY4TO1:PLAY"C+":GOSUB440
400 PCOPY3TO1:PLAY"C":GOSUB440
410 PCOPY5TO1:PLAY"C+":GOSUB440
420 PCOPY3TO1:PLAY"C":GOSUB440
430 GOTO390
440 FORI=1TOX
450 SP$=INKEY$
460 IF SP$="F" THEN X=X-5
470 IF SP$="S" THEN X=X+5
480 NEXT:RETURN
490 READ A,B
500 IF A=-1 THEN F=1 ELSE F=0
510 IF A=-9 THEN 600
520 IF A=-99 THEN 620
530 A=A+127
540 FOR I=1 TO B
550 IF F=1 THEN 570
560 POKE N,A
570 N=N+32
580 NEXT
590 GOTO490
600 C=C+1:N=X+C
610 GOTO490
620 RETURN
630 FORI=0TO31:POKE N+I,223:NEXT
:RETURN
640 '  DATA FOR PICTURE
650 DATA-1,12,80,14,128,2,123,2,
-9,
660 DATA-1,12,80,4,75,10,123,4,-
1,12,118,7,-9,
670 DATA80,9,-1,3,80,12,128,1,80
,11,128,1,80,6,128,6,-9,
680 DATA80,1,48,2,80,3,64,2,80,1
,70,3,80,12,128,1,80,11,128,1,80
,6,128,6,-9,
690 DATA80,4,-1,,80,2,64,1,80,16
,128,1,80,3,-9,
700 DATA80,1,48,2,80,3,64,2,80,1
,75,3,80,12,128,1,80,11,128,1,80
,6,128,6,-9,
710 DATA80,9,-1,3,80,12,128,1,80
,11,128,1,80,6,128,6,-9,
720 DATA-1,12,80,4,70,10,118,4,-
1,12,123,7,-9,
730 DATA-1,12,80,14,128,2,118,2,
-9,
740 FORI=0TO31:POKEN+I,223:NEXT:
RETURN
750 DATA-99,
760 DATA-1,12,118,1,-1,2,118,1,-
9,
770 DATA-1,12,128,4,-9,
780 DATA-1,12,80,4,-9,
790 DATA-1,12,80,4,-9,
800 DATA-1,16,1,3,96,1,1,1,96,1,
1,2,96,1,1,3,96,1,1,1,-9,
810 DATA-1,16,1,3,96,1,1,1,96,1,
1,2,96,1,1,3,96,1,1,4,96,1
```

```
820 DATA1,1,118,6,1,5,96,1,1,2,-
9,
830 DATA-1,31,128,1,80,4,128,5,1
,5,96,1,1,2,-9,
840 DATA-1,31,128,1,80,4,128,5,1
,5,96,1,1,2,-9,
850 DATA-99,
860 DATA-1,31,128,1,80,4,128,5,1
,5,96,1,1,2,-9,
870 DATA-1,31,128,1,80,4,128,5,1
,5,96,1,1,2,-9,
880 DATA-1,16,1,3,96,1,1,1,96,1,
1,2,96,1,1,3,96,1,1,4,96,1
890 DATA1,1,123,6,1,5,96,1,1,2,-
9,
900 DATA-1,16,1,3,96,1,1,1,96,1,
1,2,96,1,1,3,96,1,1,4,96,1,-9,
910 DATA-1,12,80,4,-9,
920 DATA-1,12,128,4,-9,
930 DATA-1,12,123,1,1,2,123,1,-9
,
940 DATA-99,
950 DATA32,1,27,2,32,1,27,3,-9,
960 DATA32,1,-1,2,32,1,27,1,22,1
,-9,
970 DATA27,4,-1,2,27,1,-9,
980 DATA70,1,80,1,75,3,80,1,70,1
,-9,
990 DATA80,2,-1,3,80,2,-9,
1000 DATA-1,1,75,5,-9,
1010 DATA64,1,59,2,64,1,59,2,64,
1,-9,
1020 DATA64,1,54,2,64,1,54,2,64,
1,-9,
1030 DATA-1,1,59,2,-1,1,59,2,-9,
1040 DATA6,1,16,1,11,3,16,1,6,1,
-9,
1050 DATA16,2,-1,3,16,2,-9,
1060 DATA-1,1,11,5,-9,
1070 DATA38,1,48,5,38,1,-9,
1080 DATA48,1,-1,5,48,1,-9,
1090 DATA43,1,-1,5,43,1,-9,
1100 DATA102,1,-1,5,102,1,-9,
1110 DATA112,1,107,5,112,1,-9,
1120 DATA-9,
1130 DATA70,1,80,2,70,1,-1,1,80,
1,-9,
1140 DATA80,1,-1,2,80,1,70,2,80,
1,-9,
1150 DATA75,1,-1,3,75,2,-9,
1160 DATA128,1,123,2,128,1,123,2
,128,1,-9,
1170 DATA128,1,-1,2,128,1,-1,2,1
28,1,-9,
1180 DATA123,1,-1,5,123,1,-9,
1190 DATA-99,
```

The CoCo
PROFESSIONAL
TAX
PREPARER
FOR THE TRS-80 COLOR COMPUTER

"...it makes income tax calculating a breeze...you owe it to yourself to learn how the right way."
—*Bob Brown, Rainbow June Software Review*

Special limited offer. Get the Professional Tax Preparer for only...$99.95

Included with the program are a complete instruction manual and sample forms. A set of 36 overlays is also available for $69.95. Take advantage of our special offer and get BOTH the program and overlays for only $149.95.

The Professional Tax Preparer runs on 32K extended Basic, with one or two disk drives, and has built-in tax tables and rate schedules. It supports Form 1040, Schedules A, B, C, D, E, G, SE, W, and Forms 2106, 2119, 3903, 4797, Office-at-Home, Installment Gain, Credits and Other Taxes.

Features include reverse-screen scrolling, forward-screen block scroll, and full on-line diagnostics to check input. A built-in calculator supports arithmetic operations on numeric data. Edit capability allows you to edit any line at any time, using change, delete, hack, search, and insert commands. Yearly updates for the Program are available.

Mail to: **Micro Data Systems**
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I need the built-in sales tax table for ____________ (state).
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Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send an SASE to: Submissions Editor, THE RAINBOW, The Falsoft Building, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

BARDEN'S BUFFER

16K
ECB

In his premier column, Bill Barden sets out to dispel some common assembly language myths . . .

The Straight, Hard Facts about Assembly Language

By William Barden, Jr.
Rainbow Contributing Editor

"Want to speed up your programs 300 times? Want to learn skills that will make you rich? Try Color Computer assembly language! To see if you have the aptitude, code this problem in BASIC and send us the result: 2 + 2 = ?. If you pass this simple test, we'd like to enroll you in 'Famous Programmers' School!"

I closed the coding pad cover on which this advertisement was printed and sat back in my Realistic DC-5 desk chair, reflecting. That's the trouble with assembly language, it's misunderstood — too many myths abound about it. Maybe I can dispel some of those myths in this column. I'll give you the straight, hard facts about assembly language. If you're satisfied, you might be interested in dropping in from month to month and following this column.

Fact Number 1: Assembly Language is Fast

Assembly language *is* fast! As you know, every microcomputer (indeed, every computer) has a built-in set of machine language instructions. Every program, whether it's written in the OS-9 C language or Extended Color BASIC, must ultimately be translated into sequences of machine language instructions. If you can write *directly* in machine language or its fraternal twin brother, assembly language, you are operating at peak speed on the Color Computer.

(Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.)

As an example of this blinding speed, consider the program in Figure 1. It's a "bubble sort" in Extended BASIC that sorts a "worst case" set of characters on the screen. The Extended BASIC program takes an estimated 4,800 seconds to do the sort. Now look at Figure 2, an assembly language equivalent. (The assembly language here has been converted into machine language and embedded into Extended BASIC DATA statements, which are then moved and executed.) The assembly language version takes six seconds!

Expect to see increases in speed in assembly language from dozens to hundreds of times over "interpretive" BASIC and from three times to dozens of times over compilers such as BASIC09 and C.

Assembly language is the standard by which every other language is based. When programmers want to develop impressive code, they invariably pick assembly language to do the development. Sure, C and PASCAL might be used for some programs where speed is not extremely critical, but assembly language is always the choice when the absolute fastest speed is required.

Fact Number 2: Assembly Language is Tedious to Code

This is the most detrimental thing about assembly language, and I don't want to downplay it. There's no ques-

Figure 1: Bubble Sort in BASIC

```
100 REM EXT BASIC BUBBLE SORT
110 REM FILL SCREEN WITH CHARS
120 CLS
130 FOR I=&H400 TO &H5FF
140 POKE I,RND(127)
150 NEXT I
160 REM ACTUAL SORT
170 BEND=&H5FF
180 I=&H400
190 SWAP=0
200 IFPEEK(I)<=PEEK(I+1)THEN260
210 FIRST=PEEK(I)
220 SECOND=PEEK(I+1)
230 POKE I,SECOND
240 POKE I+1,FIRST
250 SWAP=1
260 I=I+1
270 IF I<>BEND THEN 200
280 BEND=BEND-1
290 IF BEND=&H3FF THEN 310
300 IF SWAP<>0 THEN 180
310 GOTO 310
```

Figure 2: Bubble Sort in Assembly Language

```
                      00100 * BUBBLE SORT
4C5B 8E      0400     00110 BUB010  LDX    #$400    POINT TO START OF TEXT SCREEN
4C5E 108E 0000        00120         LDY    #0       SET SWAP FLAG TO 0
4C62 A6      80       00130 BUB020  LDA    ,X+         GET ITH ENTRY, INCREMENT
4C64 A1      84       00140         CMPA   ,X          COMPARE TO ITH+1
4C66 23      0A       00150         BLS    BUB030      GO IF LESS THAN OR EQUAL
4C68 E6      84       00160         LDB    ,X          SWAP HERE - GET ITH
4C6A E7      1F       00170         STB    -1,X        STORE IN ITH
4C6C A7      84       00180         STA    ,X          STORE FIRST IN ITH+1
4C6E 108E 0001        00190         LDY    #1          SET SWAP FLAG
4C72 8C      05FF     00200 BUB030  CMPX   #$5FF       AT END?
4C75 26      EB       00210         BNE    BUB020      GO IF NO
4C77 108C 0000        00220         CMPY   #0       YEY, ANY SWAPS?
4C7B 26      DE       00230         BNE    BUB010   IF YES, TRY AGAIN
4C7D 39               00240         RTS             RETURN
             0000     00250         END

00000 TOTAL ERRORS

          100 REM BASIC/AL BUBBLE SORT
          110 CLEAR 200,16127
          120 CLS
          130 DATA &H8E,&H04,&H00,&H10
          140 DATA &H8E,&H00,&H00
          150 DATA &HA6,&H80,&HA1,&H84
          160 DATA &H23,&H0A,&HE6,&H84
          170 DATA &HE7,&H1F,&HA7,&H84
          180 DATA &H10,&H8E,&H00,&H01
          190 DATA &H8C,&H05,&HFF,&H26
          200 DATA &HEB,&H10,&H8C,&H00
          210 DATA &H00,&H26,&HDE,&H39
          211 FOR I=16128 TO 16128+34
          212 READ A
          213 POKE I,A
          214 NEXT I
          220 FOR I=&H400 TO &H5FF
          230 POKE I,RND(127)
          240 NEXT I
          241 DEFUSR0=&H3F00
          242 SR=USR0(0)
          243 GOTO 243
```

tion that assembly language is a very tedious language to code. It may take 10 times longer to code a large program in assembly language than in BASIC. Is there any solution to this? Not really. In spite of "macro" assemblers, interactive editors, debug packages and books that promise to teach you assembly language in days, it remains tough to use.

One approach in using assembly language is to use it sparingly. Use it in short assembly language subroutines to speed up BASIC or other languages in those areas where speed is important. The bulk of the code can be the higher level BASIC, C or PASCAL. That way, you can have the best of both worlds: the programming ease of the higher level language and the speed of assembly language.

Fact Number 3: Assembly Language is Tedious to Learn

One of the reasons assembly language columns are so popular in magazines and why assembly language books sell so well is that computer hobbyists are continually looking for magic approaches to learning it. There really are none.

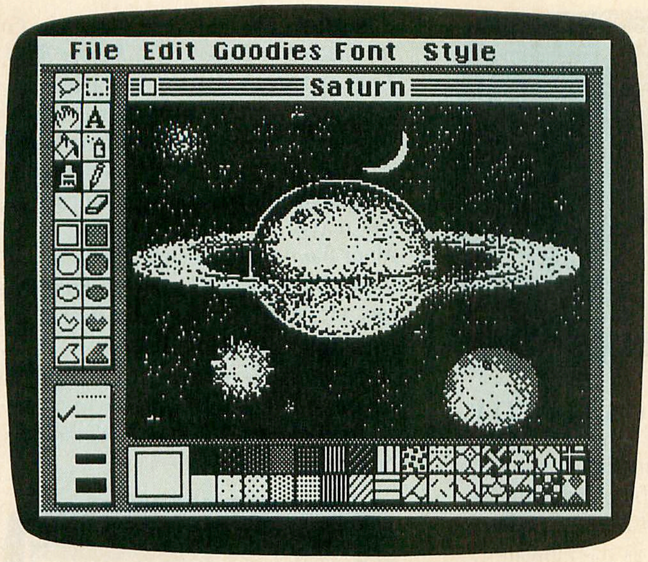
Surprisingly, it's relatively easy to learn how the machine language instructions for a microcomputer work. They are so rudimentary that they're easy to comprehend. One instruction transfers a byte from memory into a register. Another adds two bytes. Another compares two values. It's not too hard to sit down and memorize the actions of about 60 instructions, as found in the Color Computer's 6809 microprocessor.

There's much more to assembly language than memorizing the actions of instructions, though. It consists more of learning programming *algorithms* and approaches to doing things — constructing tables of data, sorting lists, using linked lists, building subroutines to print lines, and so forth. Learning assembly language, then, is more a situation of learning its structures, approach and philosophy, a kind of excursion into microprocessor Zen. However, this leads us directly into . . .

Fact Number 4: Once You've Learned One Assembly Language, You Know Them All

Once you've studied the philosophy of one assembly language and mastered the techniques, it becomes extremely easy to learn the instruction set of the next microcomputer. Assembly language for the Apple MacIntosh's 68000 is very similar to the Color Computer's 6809. Assembly language on the Tandy 1000's 8088 microprocessor is really not that different than on the Color Computer. Once you've learned one assembly language, regardless which it is, you're in good stead for the next, since you've mastered the art of using assem-

CoCo Max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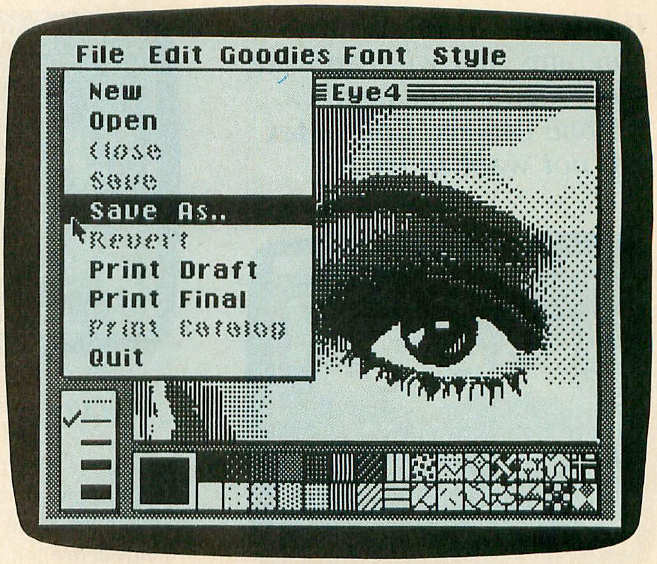
Saturn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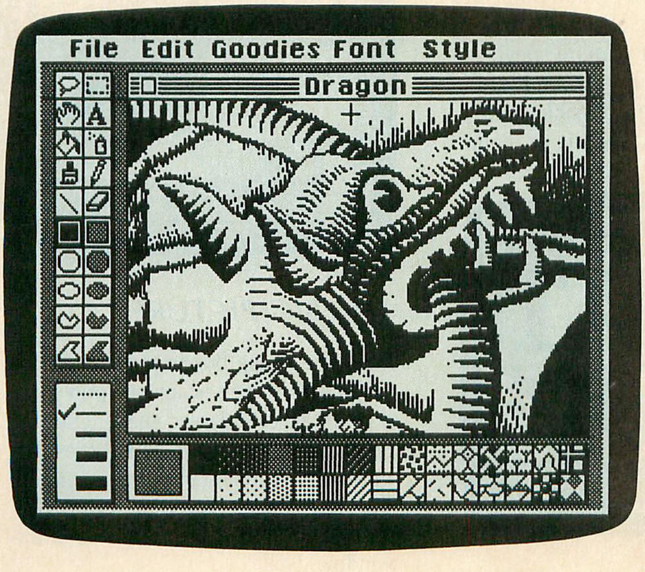
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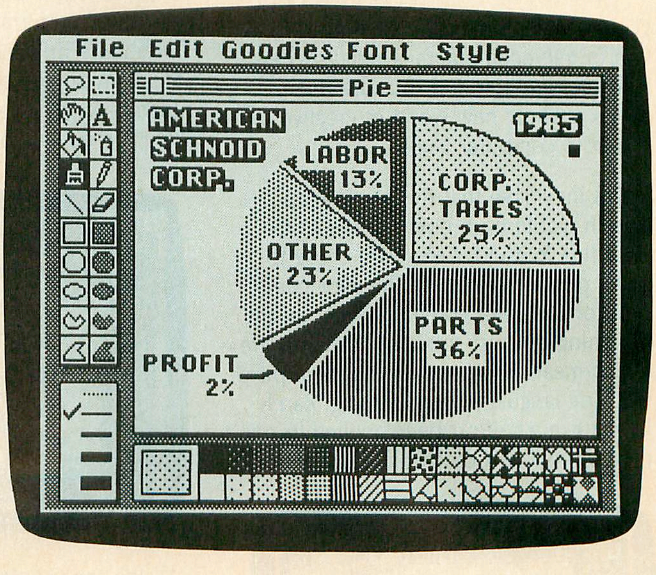
Dragon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LABOR 13%
CORP. TAXES 25%
OTHER 23%
PARTS 36%
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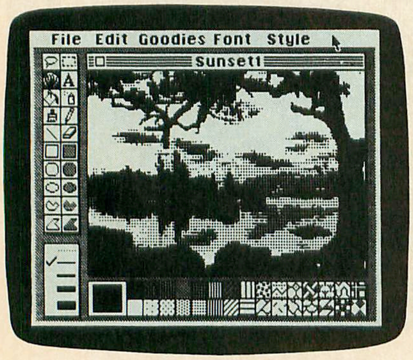
Take your CoCo to the MAX.

COLORWARE

CoCo Max

This is one of those rare programs that will captivate everyone in your family.... No one can see CoCo Max and not want to try it!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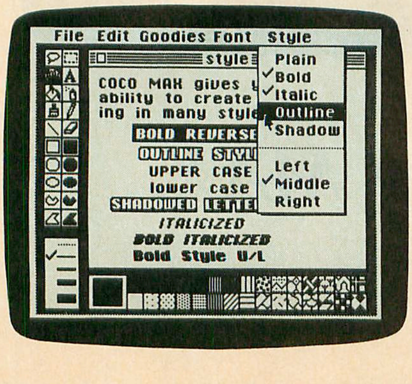
Sunset1

We are all witnessing an exciting revolution in microcomputers: a radically new kind of computer and software that opens a whole new world of creative power to computer users.

It was inevitable that this exciting approach would be brought to the CoCo. With this in mind, Colorware chose to go all out and maximize this new concept for the color computer. That meant designing not just software but hardware too. It meant thousands of hours of pure machine language programming. Rarely has this much effort been applied to one product for the Color Computer.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style
Plain
✓Bold
✓Italic
Outline
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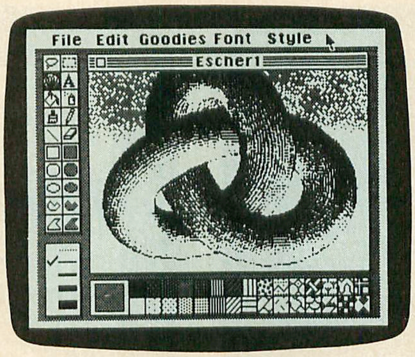
Left
✓Middle
Right

COCO MAX gives y
ability to create
ing in many style
BOLD REVERSE
OUTLINE STYL
UPPER CASE
lower case
SHADOWED LETTE
ITALICIZED
BOLD ITALICIZED
Bold Style U/L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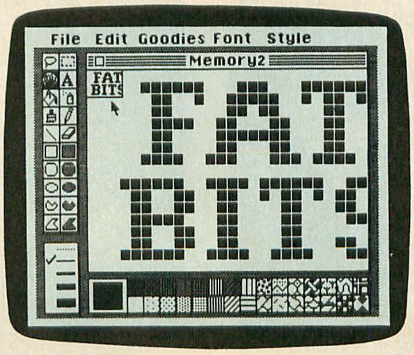
Escher1

UNMATCHED CAPABILITY...

Because we took the maximum approach: highly optimized machine code combined with hardware, CoCo Max truly stands above the rest as the ultimate creative tool for the Color Computer. It's unrivaled performance lets you create with more brilliance and more speed than any similar system – much more than you ever imagined possible. And, you can do it in black & white or color.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Memory2
FAT BITS
FAT
BITS

All the sophisticated power of the bigger systems is there: ***Icons, Pull-Down Menus,*** full ***Graphic Editing, Font Styles,*** and all kinds of handy tools and shortcuts.

Plug your joystick, mouse or touch pad into CoCo Max's Hi-Res Input Unit. Then use a delightfully simple ***Point-and-Click*** method to get any of CoCo Max's powerful graphic tools. It has them all:

You can ***Brush, Spray*** or ***Fill*** with any ***Color, Shading*** or ***Pattern.*** Use ***Rubber Band Lines*** and ***Shapes*** (square, rectangle, circle, elipse, etc.) to create perfect illustriations with speed and ease. There's a ***Pencil,*** an ***Eraser*** and even a selection of ***Caligraphy Brushes.*** And, as you can see, CoCo Max can do a lot with text.
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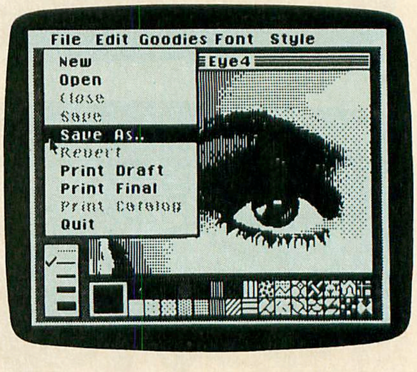
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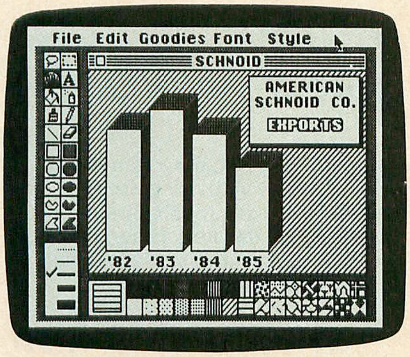

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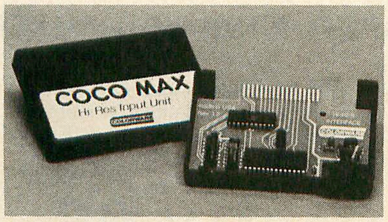
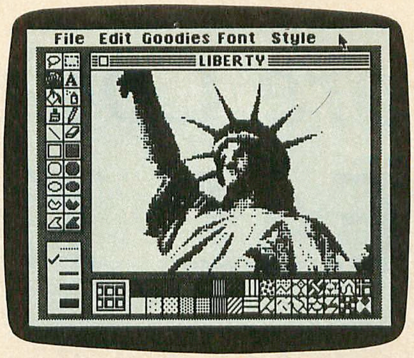
CoCo Max is a hardware/software system that no software-only system can match. Get CoCo Max and see your CoCo perform as it never could before. If you don't agree that CoCo Max is the ultimate creative tool for the Color Computer, simply return it within 20 days for a full, courteous refund from Colorware.

THE HARDWARE...

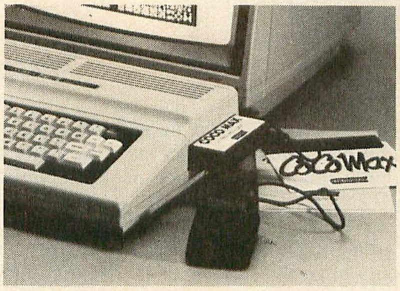
This is the key to CoCo Max's unmatched performance. Did you know the normal joystick input built into the Color Computer only allows access to 4,096 (64 x 64) points on the CoCo screen? Yet, the Color Computer's high resolution screen has 49,152 (256 x 192) pixels. This means that a joystick, mouse or even a touch pad can, at best, only access about one tenth of the pixels on the CoCo screen.



Most graphic programs ignore this hardware limitation of the Color Computer and give you only low-res control. Others attempt to overcome the limitation by using software schemes such as sliding windows. Although clever, these schemes yield sluggish and awkward results. Only CoCo Max does it the right way. The CoCo Max Hi-Res Input Unit plugs into your ROM slot and adds an entirely new joystick input to your computer – a precision one with a 49,152 point resolution to match the CoCo screen exactly.

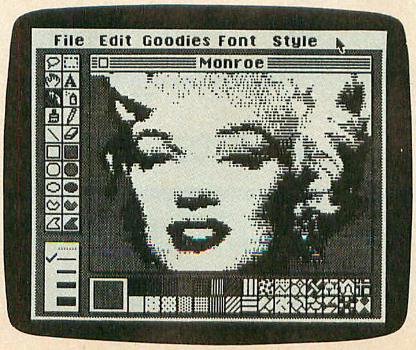


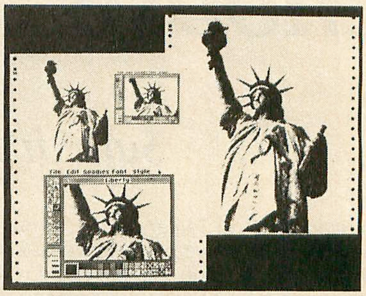
Plug your same joystick, mouse or touch pad into this new input and you have a whole new kind of control. The difference is remarkable.



A DIGITIZER OPTION...

We studied all the video digitizers available and picked the best of them to link with CoCo Max. The DS-69 from Micro Works was our choice. This optional device lets you capture the image from any video source (video recorder, camera, etc.) on your Color Computer. You may then use CoCo Max's graphic magic on it. The DS-69 is available as an option from Colorware from $149.95 complete with its own software on disk or tape. Using the DS-69 with a disk requires an RS multi-pak adaptor.

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COCO MAX REQUIREMENTS

The CoCo Max System includes the Hi-Res Input Unit, software on disk or cassette (please specify) and user manual. It will work on any 64K Extended or non-extended Color Computer. You'll need a Radio Shack or equivalent joystick, mouse or touch pad. Disk systems require a Multi-Slot Interface or Y-Branching Cable.

THE COMPLETE COCO MAX SYSTEM, with software on *DISK*........... ***$69.95***

with software on *CASSETTE* (Available Mar '85)......................... ***$69.95***

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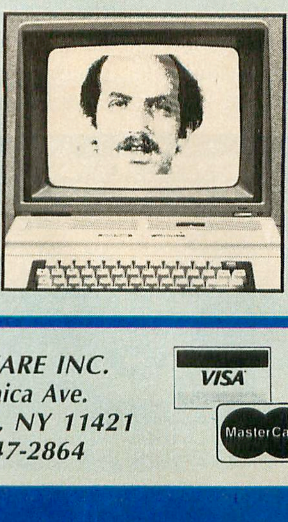

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bly language instructions to accomplish useful things.

If you're looking for the ultimate microprocessor from which to learn assembly language, look no further — 90 percent of what you learn on the Color Computer is directly applicable to any other system. Incidentally, the 6809 on the Color Computer is regarded by many to be as good or better than the 8088 on IBM compatibles. The instruction set of the 6809 is built along classical programming lines, while the 8088 has more idiosyncrasies.

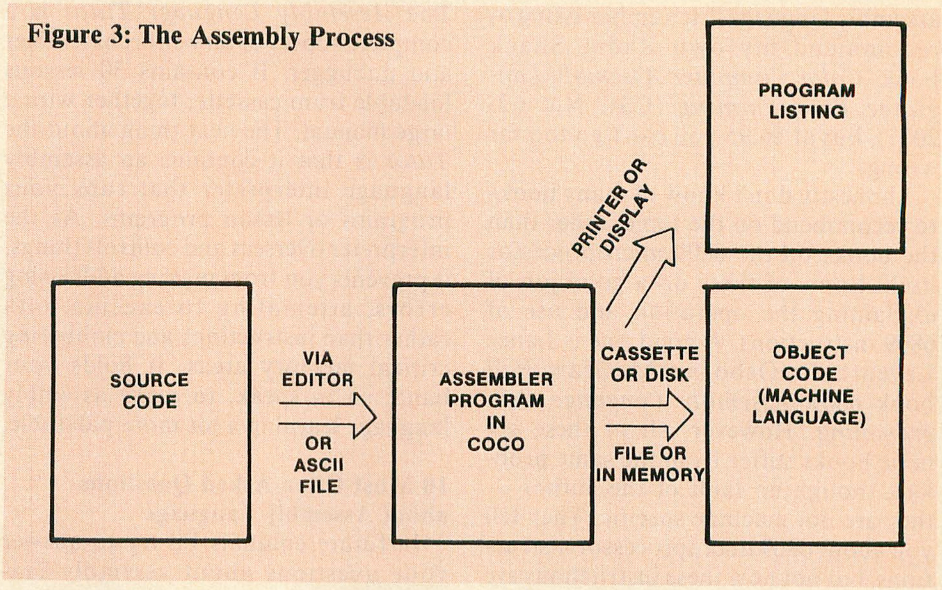
Are You Still with Me?

If so, you're a hard person to discourage. You must be a student, confirmed hacker or masochist, or possibly all three. Sigh . . . If you must learn assembly language, then we'll give you some tips on how to go about it.

Which Assembler is Best?

As you probably know, an *assembler* is a program that takes the *source code* of your assembly language program and translates it into *object code* or machine language. In the process, it provides a listing of the program and the resulting machine language, as shown in Figure 3.

Figure 3: The Assembly Process



I have mixed feelings about recommending an assembler to use. In the case of the Color Computer, the Radio Shack versions are not bad and fairly inexpensive. In addition, they have become a standard. For that reason, we'll refer primarily to Radio Shack products here. Those with other products will find, for the most part, that the code still applies.

Non-Disk System Users

If you have a Color Computer without a disk, you'll probably want to get the Color Computer *EDTASM+* Assembler/Editor (Cat. No. 26-3250). This is a cassette-based system I like very much. The product contains three functions that would ordinarily be separate programs — the editor, assembler and debugger. Because the programs occupy memory at the same time, there's no loading from cassette between functions; you can simply switch from one to another with a single keystroke or two.

The editor does pretty much what Extended BASIC does in editing — characters on lines can be manipulated in different ways. The assembler, of course, translates the source code into object code and provides a listing. It also assembles into memory rather than creating an object file, although this can also be done. Having the machine language code loaded directly into memory bypasses a cassette load of the object file and allows the debugger to be instantaneously called after assembly. The debugger (ZBUG) allows you to systematically debug the program by putting in stopping points (breakpoints), by stepping through instructions, by dumping selected areas of memory, and so forth.

Disk System Users without OS-9

If you're not an OS-9 user and run Disk BASIC, then Radio Shack provides a disk version of *EDTASM+* — *Color Disk EDTASM* (Cat. No. 26-3254). This version contains all of the commands of *EDTASM+* and a few more — it's essentially an upgrade of the cassette product. Using *Disk EDTASM*, you can save source and object files on diskette, a decided advantage with long programs.

Disk System Users with OS-9

I know Dale Puckett is going to kill me for this, but I have to say it: Learning assembly language with the OS-9 editor, assembler and debugger is much more of a task than using *Disk EDTASM*. The OS-9 program development tools are powerful, but more complex than the stand-alone *Disk EDTASM*, and you must pay more attention to the OS-9 environment in which you're operating.

However, if you are a confirmed OS-9 buff, it is certainly possible to learn OS-9 assembly language. The instructions and mnemonics for the 6809 are the same, as are many of the other commands provided for assembly. If you choose the OS-9 route, you'll learn more about how assembly language works in an operating system environment, if you can get past some of the frustration and complexities of OS-9 itself.

Other Assemblers

A non-Radio Shack product I like is the Micro Works Macro-80C Disk Assembler. I started using this product because there was no disk assembler from Radio Shack at the time. Although not as integrated as Radio Shack *EDTASM*, it is a nice, well-thought out product.

Books and Tutorials

It will surprise some readers to find out I can't present an entire course on assembly language in the pages of RAINBOW. Think about it for a moment, though. In each column I have about 3,500 words to present my rambling discourses. That's 42,000 words a year, which might be enough for an introductory text on Color Computer assembly language. There's also the problem of new subscribers and just the overall length of time involved. It's difficult to take a semester course over a year or more. For that reason, I'll use the column to cover interesting points about assembly language programs, present some practical, short programs and, in general, act as a supplement to your own study.

An obvious question you might have is, "What books can I use to learn assembly language?" It's embarassing to recommend my own Radio Shack book, *Color Computer Assembly Language Programming* (Cat. No. 62-2077), but at $6.95 you can't go too far wrong.

I honestly don't know of many books to recommend on the topic, other than the books on the 6809 microprocessor itself. Some of these do a good job of explaining the operation and use of 6809 instructions. A good one is Lance Leventhal's Osborne/McGraw Hill book *6809 Assembly Language Programming*. However, all of these generic books suffer from the same problem, though no fault of the author — they are not machine specific. They tell you about 6809 microprocessor instructions, but not how these instructions are used on any specific machine, such as the Color Computer. One must, if only for an absolute reference, is Motorola's *MC6809 Programming Manual*, available from Motorola Semiconductor Products, Inc., 3501 Ed Bluestein Blvd., Austin, TX 78721.

Another product is Dennis Kitsz's Green Mountain Micro tutorial course called "Learning the 6809." It comes complete with audio tapes of 24 lessons and programs and a 224-page manual. This course is geared around *EDTASM+*, the cassette version of Radio Shack's editor/assembler/debugger, and is excellent. It covers not only the instruction set of the 6809, but also the structure and hardware of the Color Computer. About the only criticism that can be made of the course is its price of $99, a little dear for many CoCoists.

Another product is the *Assembly Language Tutor* (26-3148, Page 46 of Computer Center Catalog RSC-15). The *Assembly Language Tutor* is a complete subset of an editor, assembler and debugger. It contains 30 lessons loadable from cassette, together with a large manual. The neat thing about the *Tutor* is that it contains an assembly language interpreter that runs your programs or lesson programs. As the interpreter oversees and controls things, it prevents you from making addressing errors, attempting to execute data rather than instructions and clobbering critical memory areas. It holds your hand, so to speak, to make assembly language learning a lot more palatable.

10 Most-Often Asked Questions about Assembly Language

In future columns I'll try to answer your questions about assembly language. If you have questions please drop me a line at RAINBOW, or leave a message on Delphi or the CoCo SIG of CompuServe. I'll try to answer the most common questions. For this first column, I'll answer 10 questions that keep popping up again and again.

Question 1: What are Macros and Why are They Used?

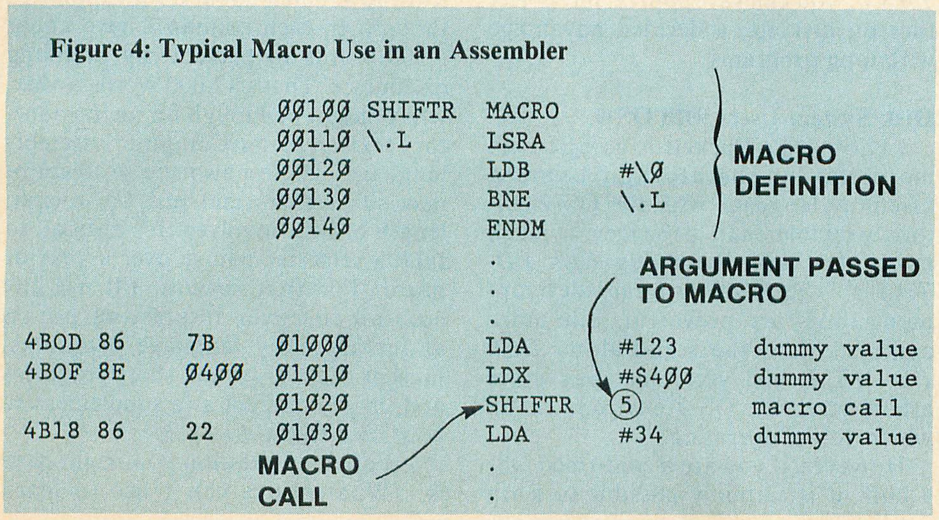
A "macro" is simply a sequence of instructions, ranging from one to hundreds. A typical macro might consist of four instructions, such as the ones shown in Figure 4. The instructions in this figure shift Register A right in a logical shift a specified number of positions. The macro is defined in a definition shown in the first part of the listing. Later, the macro can be "invoked" by writing down the macro name as shown in the SHIFTR mnemonic.

When the assembler sees the macro name in place of the usual instruction mnemonic, it searches a list of macro definitions, finds the instructions defined for the macro and automatically generates the instructions as if you had typed them in at that point. If the macro is invoked 10 times in a program, the same instructions are generated for each occurrence.

The advantage of the macro is that only one line of code can produce many lines automatically. Macros are a sort of "in-line" subroutine. In the example in Figure 4, the macro used one argument, but the line invoking the macro may also contain more arguments that are used within the macro body of code.

> ***"Assembly language is the standard by which every other language is based. When programmers want to develop impressive code, they invariably pick assembly language to do the development."***

Figure 4: Typical Macro Use in an Assembler



```
                    00100 SHIFTR   MACRO
                    00110 \.L      LSRA
                    00120          LDB      #\0
                    00130          BNE      \.L
                    00140          ENDM
                                   .
                                   .
                                   .
4BOD 86      7B     01000          LDA      #123       dummy value
4BOF 8E    0400     01010          LDX      #$400      dummy value
                    01020          SHIFTR   ⑤          macro call
4B18 86      22     01030          LDA      #34        dummy value
                                   .
                                   .
```

Question 2: What is Position-Independent Code and Why is it So Important?

Position-independent code is also called relocatable code for some microprocessor instruction sets. Position-independent code is not at all important when instructions are assembled for a specific location in memory. Figure 5, for example, shows an LDA CONST1 instruction, which loads Register A in the 6809 with the contents of a memory location called CONST1, a constant. After assembly, the location of CONST1 is at location $400A and the LDA address is $4000. As long as the program is loaded in the $4000 memory area, the LDA operates as it should, loading Register A with the contents of memory location $400A.

Suppose the machine language code is moved to $7000. The LDA should refer to a location (Hex A) 10 bytes away from the start of the program at $700A. Instead, it refers to location $400A! The LDA is not position independent.

Figure 5: Position-Independent Code Example

```
Original Code:
```

POINTS TO $400A

```
4000              00100          ORG    $4000
4000 B6   400A    00110 START    LDA    CONST1
4003 C6   10      00120          LDB    #$10       constant
4005 8E   0400    00130          LDX    #$400      screen start
4008 20   34      00140          BRA    NEXT       jump over CONST1
400A      FF      00150 CONST1   FCB    $FF        constant
                                  .
                                  .
```

```
Relocated Code:
```

STILL POINTS TO $400A!

```
7000              00100          ORG    $4000
7000 B6   400A    00110 START    LDA    CONST1
7003 C6   10      00120          LDB    #$10       constant
7005 8E   0400    00130          LDX    #$400      screen start
7008 20   34      00140          BRA    NEXT       jump over CONST1
700A      FF      00150 CONST1   FCB    $FF        constant
                                  .
                                  .
```

```
Code with PCR:
```

THIS DISPLACEMENT ADDED TO PC
TO GET ADDRESS OF CONST1

```
4000              00100          ORG    $4000
4000 A6 8D 0007   00110  START   LDA    CONST1
                                  .
                                  .
```

In the last part of the figure, the LDA CONST1 has been replaced with an LDA CONST1,PCR instruction. This instruction assembles without an absolute memory address — the address is computed from the current contents of the PC (Program Counter) register and an offset value in the instruction. The position-independent form of the LDA always loads the value 10 bytes away from the program start, and is position-independent.

It's important to have position-independent code in several cases. OS-9, for example, loads assembly language code in different memory areas and much of the code must be position-independent. Even if you are not using OS-9, you cannot always guarantee that your program will be loaded in a specific memory area unless you take pains to do so. If your code has been converted to machine language DATA bytes and relocated to an array area in BASIC, for instance, you might not be able to know beforehand where that array area will be.

On the other hand, for simple programs outside of an OS-9 environment, you don't have to worry too much about position-independent code. Simply assemble your programs at a specific memory area and never move the machine language bytes anywhere else.

Question 3: What's the Proper Way to Write Assembly Language Programs?

Actually, there is no single way to solve a problem in assembly language code. There are usually many ways to write the assembly language code for a particular problem. Some ways might be more efficient than others, but assembly language is so fast that you can afford to be sloppy and still get the job done. At first, concentrate only on program design — using the right plan or algorithm to solve the problem. Later, as you become more experienced in assembly language, you can make your code more efficient and elegant.

Assembly language is a great deal less interactive than a higher level language such as BASIC. You must carefully plan out the program design before even starting to code the problem. You should even consider "flow charting" the problem to get a clear idea of how to proceed. Breaking up a large problem into modules (subroutines) is also a good idea.

Question 4: What about I/O Operations in Assembly Language?

Input/output in Color Computer assembly language is best handled by using the BASIC "I/O drivers." The I/O drivers are assembly language code contained in BASIC ROM; they handle such I/O as text screen display, reading a character from the keyboard, reading and writing to tape and disk files, and other operations.

Some of the I/O calls are "documented," that is, defined in Radio Shack documentation. Other I/O calls are usable, but may change in subsequent versions of BASIC or new systems. Of course, you can write your own I/O drivers from scratch within your assembly language program, but it's less work to use standard drivers.

Going Ahead with Extended Color BASIC lists standard I/O drivers near the back of the book, and the Assembler manuals also reference I/O drivers. A typical driver is POLCAT (a little Texas humor there), the "Poll Keyboard for a Character" ROM subroutine, accessible by a call to location $A000. If a key is being pressed, it will be returned in Register A with the 'Z' flag set.

Question 5: What are Condition Codes and What are They Used for?

The condition codes in the 6809 are a set of eight "flags." Although these flags are separate from each other, they are grouped together as the condition codes register to make them easier to handle. The main purpose of the flags is to record the results of arithmetic instructions.

In adding or subtracting two numbers, for example, it's handy to know whether the result of the operation is a negative number, zero or greater than zero. The condition codes record this information as part of the add or subtract instruction. The condition codes can be tested by Branch instructions. This sequence subtracts 12 from the contents of Register B and branches (a BASIC GOTO) to location NEXT1 if the result of the subtract is zero:

```
SUBB  #12      subtract 12
BEQ   NEXT1    branch if result=0
```

Some instructions set the condition codes and some do not. All of the arithmetic instructions *do* set the condition codes so a Branch instruction can be used to alter the path of the program, if necessary.

Question 6: What are Interrupts?

Interrupts are used in computers to temporarily suspend execution of one program, called the "background" program, and to initiate a short new

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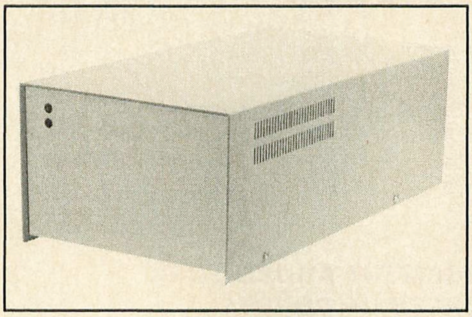

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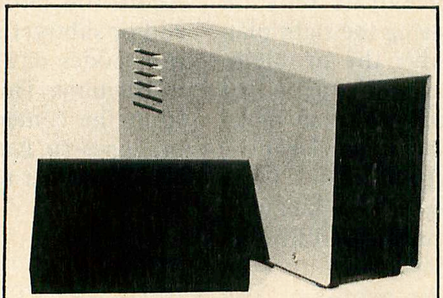

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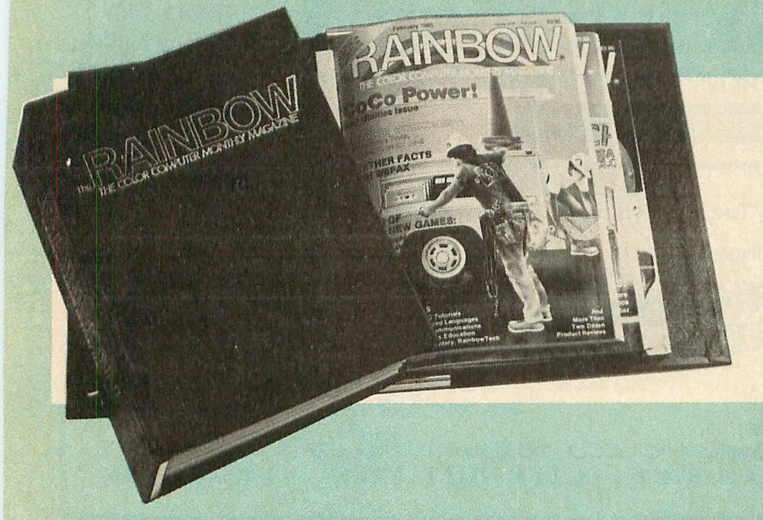

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program called a "foreground" program. If the Color Computer is being used to monitor a nuclear reactor, for example, it might be beneficial to have the CoCo suspend printing paychecks and ring a bell when the coolant temperature reaches a critical point. An interrupt provides this ability.

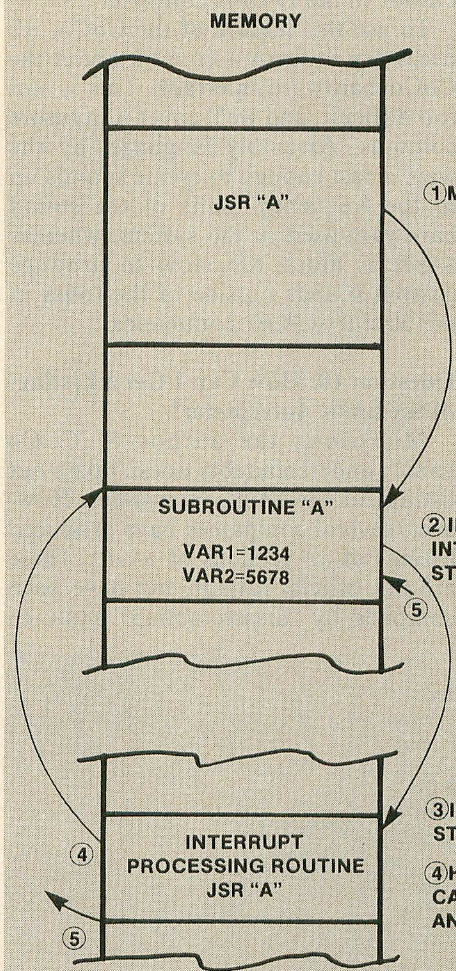
There are two basic types of interrupts, maskable and non-maskable. A maskable interrupt can be enabled or disabled under program control. A non-maskable interrupt is always active and cannot be disabled. The CoCo has both.

When an interrupt occurs and it is not catastrophic, the interrupt action is taken (such as ringing a bell for one second) and the interrupted program is then resumed. The interrupted program isn't aware that the interrupt occurred and goes blithely on its way, churning out the remainder of the paychecks. In a way, then, interrupts allow a type of "multitasking," where one task is a much higher priority than the other.

> ***"If you're looking for the ultimate microprocessor from which to learn assembly language, look no further — 90 percent of what you learn on the Color Computer is directly applicable to any other system."***

You may never use interrupts in your beginning assembly language programming and don't have to be aware of them in many short assembly language programs.

Figure 6: Reentrant Problem



①MAIN PROGRAM CALLS SUBROUTINE "A"

②IN THE MIDDLE OF THE SUBROUTINE AN INTERRUPT OCCURS. VAR1 AND VAR2 HAVE STORED TEMPORARY RESULTS

③INTERRUPT PROCESSING ROUTINE IS STARTED

④HOWEVER, INTERRUPT PROCESSING ALSO CALLS "A". THE SUBROUTINE IS REENTERED, AND VAR1 AND VAR2 ARE USED AGAIN

⑤AT END OF INTERRUPT PROCESSING SUBROUTINE "A" IS REENTERED AT INTERRUPT POINT WITH INVALID VAR1 AND VAR2

Question 7: What is Reentrant and Recursive Code?

Reentrant code relates to the interrupts just discussed. When a subroutine can be interrupted and is used by both the main program and an interrupt, it is said to be reentrant. Unless care is taken in the way variables are handled within the subroutine, it is possible to clobber the variables used by the main program when the interrupt code calls the subroutine again (see Figure 6). This problem is usually handled by not having a common subroutine for both the main program and interrupt procedure, or by using the stack to store temporary data.

Again, as in the case of Question 6, don't worry about reentrant code unless you are doing interrupt processing, and even then it often won't be a problem.

A recursive subroutine calls itself, possibly several times. Like reentrant code, special actions must be taken to save all levels of processing, usually in the stack.

Question 8: How Can I Use Assembly Language to Speed Up My Graphics?

Assembly language *can* be used to speed up graphics and with great success, but you may have more work than you bargained for. For one thing, to process graphics you'll need your own set of assembly language subroutines to handle graphics actions, such as drawing lines, creating shapes and implementing windows.

An alternative is to use some of the built-in graphics contained in ROM code. However, this latter course has built-in dangers, as most of the ROM calls are not documented by Radio Shack. If they are used, be prepared to change addresses when the next version of BASIC or a new system appears.

Creating your own graphics subroutines may involve a great deal of work. The Extended BASIC `CIRCLE` command, for example, draws a circle by drawing a polygon of many sides. It takes some effort to implement such code in assembly language!

Question 9: How Can I Use Assembly Language for Sound?

Assembly language can be used for incredible sounds from the CoCo. Sound is produced in the CoCo by a digital-to-analog converter, which allows you to synthesize sounds by creating a wave form, as shown in Figure 7. The tones used for cassette tape, for example, are actually created from a sine wave table in ROM, a series of numeric values that are continually output to the D-to-A converter.

To use this feature of the CoCo, it's necessary to learn a little bit about the CoCo hardware interface. This is not too difficult, and we'll cover it in future columns. Assembly language, by the way, is fast enough to create sounds up to the frequency limits of the sound hardware used in the system, whereas BASIC is much too slow to produce custom sounds outside of the tones in the `SOUND` or `PLAY` commands.

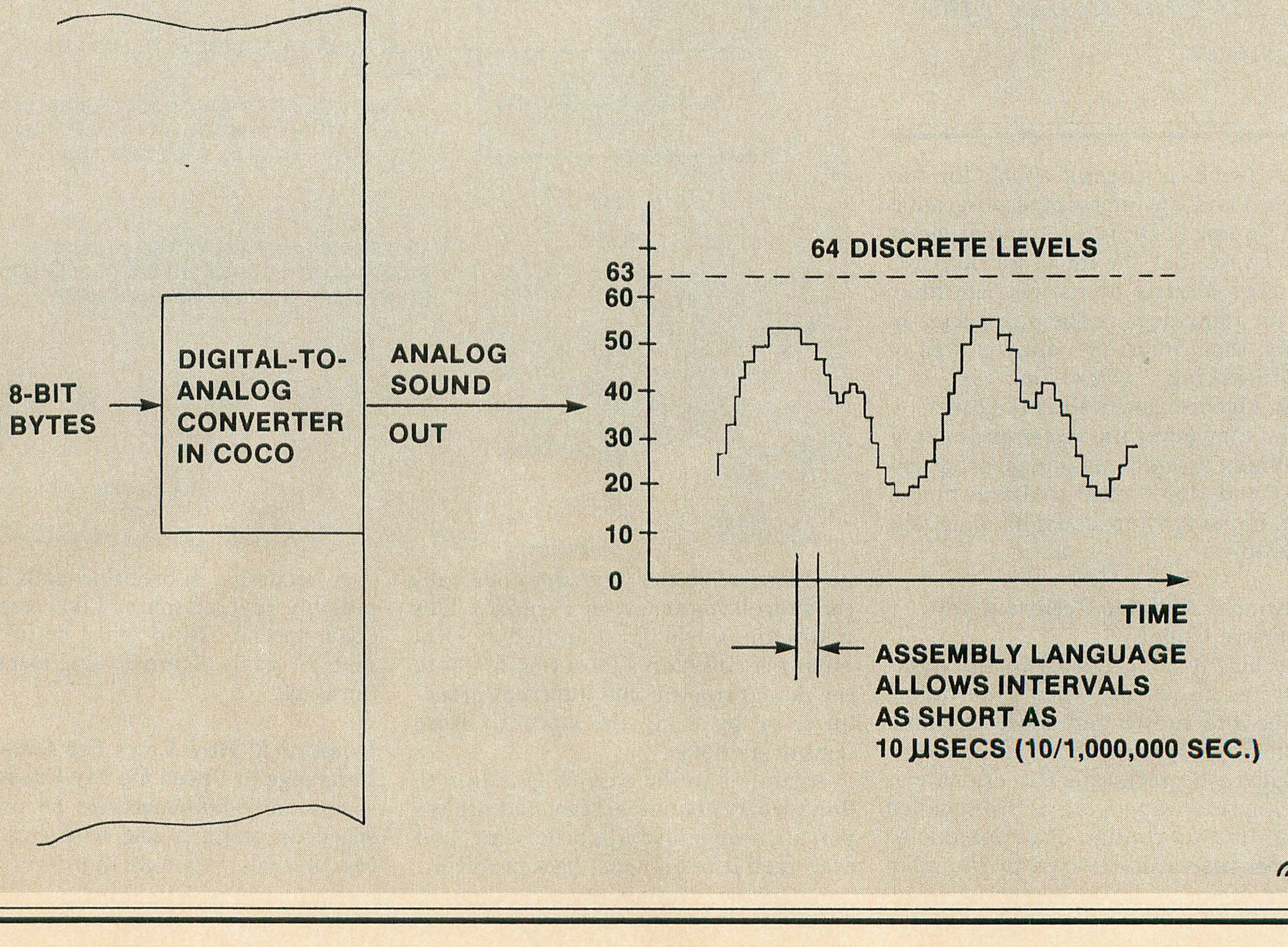
Question 10: How Can I Get a Listing of the BASIC Interpreter?

Microsoft, the author of CoCo BASIC, understandably doesn't pass out listings of the BASIC interpreter. However, several companies have produced listings of all versions of BASIC. These are not official listings, but have been compiled by "disassembling" BASIC to list the instructions used, figuring out what the instructions do, then adding their own comments. For the most part, these listings are very well-done and reveal such things as ROM subroutine calls and BASIC procedures. They're invaluable to anyone interested in the "internals" of BASIC and how functions and commands are implemented in assembly language.

Another alternative to discovering the secrets of BASIC is to disassemble it on your own. This can be done by using the ZBUG mnemonic mode in *EDTASM+* or *Disk EDTASM*. This mode displays the contents of memory as instruction mnemonics by converting the machine code numeric values into the appropriate instructions.

In future columns we'll talk in-depth about all of the topics mentioned here. Once again, if there are any topics you'd like discussed, write me at RAINBOW, contact me at Delphi or CompuServe, or simply write to P.O. Box 3568, Mission Viejo, CA 92692. See you next month. In the meantime, keep assembling! ☐

Figure 7: Digital-to-Analog Wave Forms


8-BIT BYTES
DIGITAL-TO-ANALOG CONVERTER IN COCO
ANALOG SOUND
OUT
64 DISCRETE LEVELS
63
60
50
40
30
20
10
0
TIME
ASSEMBLY LANGUAGE ALLOWS INTERVALS AS SHORT AS 10 µSECS (10/1,000,000 SEC.)

RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program istings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

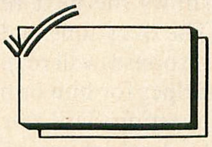
What's A CoCo

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS,* type in the program and CSAVE it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine language programs are one of the features of THE RAINBOW. There are a number of ways to "get" these programs into memory so you can operate them.

The easiest way is by using an editor/assembler, a program you can purchase from a number of sources.

An editor/assembler allows you to enter mnemonics into the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand-assemble some programs.

Use the following program if you wish to hand-assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7F80.

The Rainbow Seal

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SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

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There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

EDUCATION NOTES

16K
ECB

Gaining Insight Into Your Child's Self-Image

By Steve Blyn
Rainbow Contributing Editor

Schools are in a unique position due to their obligation to reach and teach the entire population. Consequently, they exert a major force in the process of transferring fundamental values from one generation to another. A self-image, hopefully a positive one, is a necessary component of learning these social values.

This article presents a program that can become part of a guidance system at home or in your classroom.

This month's program, *Who Am I?*, deals with the topic of helping children develop a good self-image. The program is in the form of a questionnaire. This type of guidance goal deals with forming attitudes and developing reasoning processes rather than imparting any factual knowledge. There are, therefore, no right or wrong student responses to the questions. On the contrary, we should be prepared for a wide variety of student thoughts and feelings in response to the questions.

The giver of the questionnaire, either parent or teacher, must try to create a climate where empathy and trust are established before beginning this or any similar activity. We do not want children to give answers they think will make us happy. We want, instead, the children to give honest answers that you may explore with them afterward.

Children's answers to such questionnaires are often very revealing. It is not uncommon to find children with obviously very poor self-images. We all go through periods of life where we may have a relatively poor self-image. As adults, we have hopefully learned how to deal with and modify our feelings.

Your work really begins after the questions are answered. The answers may expose problems that are bothering the child about his or her feelings. This is your chance to apply a little guidance. We want to help impart strategies for change or means of coping with these feelings. If done in a group setting, it is often helpful for children to hear their type of negative feelings expressed by others. There's a little bit of the "Charlie Brown" poor self-image in all of us.

Lines 90-130 set the tone of the program by drawing a silhouette of a large letter 'I'. Lines 140-340 print the 13 key questions and the child's responses. This comprises the bulk of the questionnaire. There is little room on the screen for the answers. It is best to instruct children to keep their answers short, although there is really no problem if any of the answers are longer than the space allotted since the entire answer is stored and reappears in the next section of the program.

There is additionally a final question. Lines 380-480 contain ample room for three answers to the statement "What I like about myself." This section appears on a new screen. Pressing the up-arrow key then the ENTER key allows you to utilize the questionnaire that was just completed. Each press of the ENTER key shows the next response in the series. The questions and the child's complete responses will reappear as a reminder or helper for him or her to answer the final question. This can also serve as a review for both of you. The items are recalled by lines 580-650.

An option for a permanent hard copy is provided as the final part of the program. The printout is useful as we tend to forget the responses. An alternative is for you to write the answers down on a sheet of paper as the child enters them into the computer. Line 490 asks you to press the 'E' key to end the program or the up-arrow key to get the printout. The printout is performed by lines 520-560.

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.)

The questions contained in this program were taken from a guidance bulletin published by the New York City Board of Education. Another activity I like very much from this bulletin presents a slightly different way of helping to look at a child's self-image. It is called the "Coat of Arms" game. The child or class is given a blank outline of a shield divided into four parts. In each of the parts, they draw response to the following four items.

A) Draw two things you do well.

B) Draw your greatest success in life.

C) Draw two things you would do if you had only one more year to live.

D) Draw two things you would like said about you.

The resulting picture represents the child's individual "coat of arms." The adult can glean valuable information about the child's values and self-image. This leads to similar follow-up discussions as with the questionnaire.

The "Coat of Arms" activity is just as good an activity as the questionnaire. Consider, however, the challenges of programming that it presents. Perhaps one of you readers would like to take up this challenge. We at Computer Island would love to see the results of any of your efforts in this direction. In any case, we always enjoy hearing from the readers of our column. □

270 70
480 123
END 163

The listing: WHO AM I

```
10 REM"WHO AM I?"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1986"
30 CLEAR 2000
40 DIM A$(13),B$(13),N$(3)
50 CLS0
60 W$=STRING$(28,143)
70 Z$=CHR$(128)+CHR$(128)
80 PRINT@11," who am i?";
90 PRINT@32," ":PRINT
100 FOR Y=1 TO 9
110 PRINT@98+Z,W$;
120 Z=Z+32:NEXT Y
130 PRINT@384," ":PRINT
140 A$(1)="I AM "
150 PRINT@32,A$(1);:LINEINPUT B$
(1)
160 A$(2)="I FEEL GOOD WHEN "
170 PRINT@64,A$(2);:LINE INPUT B
$(2)
180 A$(3)="I FEEL BAD WHEN "
190 A$(4)="I LIKE PEOPLE WHO "
200 A$(5)="I LIKE TO PLAY "
210 A$(6)="I DON'T LIKE "
220 A$(7)="I GET ANGRY WHEN "
230 A$(8)="I AM BEST AT "
240 A$(9)="I AM PROUD WHEN "
250 A$(10)="I AM NERVOUS WHEN "
260 A$(11)="I AM AFRAID TO "
270 FOR T=3 TO 11
280 PRINT@98+L,A$(T);:LINEINPUT
B$(T)
290 PRINT@126+L,Z$;
300 L=L+32:PLAY"O2L30GCG":NEXT T
310 A$(12)="I AM BORED WHEN "
320 PRINT@384,A$(12);:LINEINPUT
B$(12)
330 A$(13)="I DO BEST WHEN I'M "
340 PRINT@416,A$(13);:LINEINPUT
B$(13)
350 PRINT@486,"PRESS ENTER TO GO
 ON";
360 EN$=INKEY$
370 IF EN$=CHR$(13) THEN 380 ELS
E 360
380 CLS:PRINT@3,"WHAT I LIKE ABO
UT MYSELF";
390 PRINT@64,"1.";
400 PRINT@160,"2.";
410 PRINT@256,"3.";
420 PRINT@354,W$;
430 PRINT@384,"ENTER ^ TO REVIEW
 YOUR ANSWERS.";
440 FOR K=1 TO 3
450 PRINT@66+V,"";:LINEINPUT N$(
K)
460 IF N$(K)="" OR N$(K)=" " THE
N 450
470 IF N$(K)=CHR$(94) THEN GOSUB
 590:GOTO 450
480 V=V+96:NEXT K
490 PRINT@416," ":PRINT@384,"ENT
ER ^ FOR PRINTOUT OR E TO END";
500 EN$=INKEY$
510 IF EN$="^" THEN 520 ELSE IF
EN$="E" THEN 660 ELSE 500
520 PRINT#-2,TAB(10)"WHO AM I?"
530 FOR T= 1 TO 13:PRINT#-2," ":
PRINT#-2,A$(T)B$(T):NEXT T
540 PRINT#-2," "
550 PRINT#-2,TAB(10)"WHAT I LIKE
 ABOUT MYSELF":PRINT#-2," "
560 FOR T=1 TO 3:PRINT#-2," ":PR
INT#-2,N$(T):NEXT T
570 GOTO 660
580 REM"REVIEW THE ITEMS"
590 FOR T= 1 TO 13
600 PRINT@416," ":PRINT@448," "
610 PRINT@416,A$(T)+B$(T)
620 PLAY"O3L50CDEFG"
630 EN$=INKEY$
640 IF EN$=CHR$(13) THEN NEXT T
ELSE 630
650 RETURN
660 END
```

Computer Island Educational Software

227 Hampton Green, Staten Island, New York 10312
(718) 948-2748

PROGRAM TITLE	GRADES	MEMORY	PRICE
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Preschool I - counting	Pre-K	16K Ext.	11.95
Preschool II - adding	Pre-K	16K Ext.	11.95
Preschool III - alphabet	Pre-K	16K Ext.	11.95
Music Marvel-play songs	Pre-K,1	16K-Ext.	11.95
Arrow Games - 6 games	Pre-K,1	32K-Ext.	21.95
First Games - 6 games	Pre-K,1	32K-Ext.	24.95
Mr. Cocohead-facemaker	K-3	16K-Ext.	16.95
Bentley Bear	Pre-K	32K-Disk	29.95
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Beyond Words 2-3 parts	6-8	32K-Ext.	19.95
Beyond Words 3-3 parts	9-12	32K-Ext.	19.95
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Vocabulary 2-1000 words	6-8	32K-Ext.	19.95
Vocabulary 3-1000 words	9-12	32K-Ext.	19.95
Context Clues	4,5,6,or 7	16K-Ext.	17.95
Cocojot - jotto game	3-up	16K	11.95
Reading Aids - 4 parts	2-4	16K-Ext.	19.95
King Author - writing tool	2-6	16/32 Ext.	29.95
Cocowheel of Fortune	4-up	32K-Ext.	19.95
Context Clues	2-3	32K-Ext.	19.95
FOREIGN LANGUAGES			
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French Baseball-500wds.	4-up	32K-Ext.	19.95
Spanish Baseball-200wds	4-up	16K-Ext.	11.95
Spanish Baseball-500wds	4-up	32K-Ext.	19.95
Italian Baseball-200wds.	4-up	16K-Ext.	11.95
Hebrew Alphabet	beginners	16K-Ext.	11.95
Hebrew Utility	drawing utility	16K-Ext.	15.95
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Factory by Sunburst	4-up	32K-disk	44.95
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Teasers by Tobbs-Sunb.	4-up	32K-disk	44.95
Inner City - simulation	7-up	32K-disk	49.95
Find The Math Sequence	4-up	32K-Ext.	19.95
Stranded-graphic advent.	4-up	32K-disk	24.95
TEACHER/STUDENT AIDS			
Colorgrade - gradebook	Adult	32K-disk	29.95
Quizmaker - write quizzes	5-up	32K-Ext.	24.95
ETT typing tutor (CocoWarehouse)	4-up	16K-Ext.	21.95
The Puzzler (ColorConnection)	4-up	32K-disk	29.95

Computer Island

PROGRAM TITLE	GRADES	MEMORY	PRICE
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McCoco's Menu	3-5	16K-Ext.	14.95
Moneypak	2-5	32K-Ext.	24.95
Graph Tutor	3-7	32K-Ext.	19.95
Graph-It	7-up	16K-Ext.	14.95
Math Invaders	1-8	16K-Ext.	17.95
Mathquiz - 4 operations	2-5	32K-Ext.	19.95
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Skill Tutor Series			
Division Tutor	3-7	16K-Ext.	14.95
Multiplication Tutor	3-7	16K-Ext.	14.95
Factors Tutor	5-8	16K-Ext.	19.95
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Trigonometry	8-10	32K-Ext.	24.95
Equations Linear	7-9	32K-Ext.	19.95
Equations Quadratic	8-11	32K.Ext.	19.95
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5 Educational Programs with Lightpen	1-2 or 3-6	32K-disk	44.95
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Disk indicates available on disk only.
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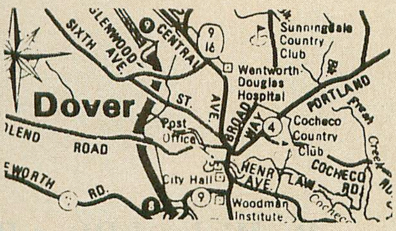
The Educational Answers

SCIENCE GAME

32K EB - disk only/$29.95

Over 600 questions in 9 categories. Makes learning science facts fun. Game format, 1 or 2 players, teams. Grade 8 and up.



STREET MAP GAME

32K - $19.95 tape/$24.95 disk

Hi-res. screen and graphics portray a typical section of a street map. This one shows people's homes, the school, the park, etc. Questions on how to get from one place to another are asked and the footsteps are shown.

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32K - disk only - $29.95

A hi-res. 4 part program that drills high school students in Elements, Symbols, Naming Compounds, Common Ions, and Balancing Equations. Correct answer given after 2 incorrect responses. A valuable tool for studying chemistry.

5 LIGHTPEN PROGRAMS

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Five menu driven educational programs designed for children in grade 1 and 2, and special educational students. Basic addition, basic multiplication, shape series matching, number series matching and word rhyming are included. All on a HI-RES screen, with graphics. User need only to use the light pen to operate the programs. **(LIGHT PEN INCLUDED)**

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Learn to locate coordinates on a grid. HI-RES text and graphics.

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Triangles, rectangles, and circles are covered in this HI-RES text and graphics program.

SALES & BARGAINS

32K EB - tape/$19.95

Learn to find the discounted price. HI-RES text and beautiful graphics.

DISTANCE PROBLEMS

32K EB - tape/$19.95

Moving graphics and text combines on a HI-RES screen. Rate x Time = Distance in all its forms.

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2. COMPARISON SHOPPING
3. DISTANCE PROBLEMS
4. SALES AND BARGAINS

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A set of programs designed to introduce and provide practice in the skills of filing out bank applications, deposit and withdrawal slips, and computing bank account balances. Loaded with graphic presentations. Grades 3-6.

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DOLLARS & SENSE

16K-Ext. - $14.95 tape/$19.95 disk

Learn to make purchases. Graphic displays of items kids love. Player buys items using dollars and coins to practice using money correctly. Solutions given.

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The results of a national Gallup Poll conducted on attitudes toward public schools

The Schools Get a Report Card

By Michael Plog, Ph.D.
Rainbow Contributing Editor

Phi Delta Kappa is a professional education association that provides several services to the educational community. One activity they sponsor is a Gallup Poll of public attitudes toward schools. The Gallup organization has conducted this poll for 17 years, and has released the results of last year's (1985) poll.

One set of key questions asked in the poll is for respondents to give a grade (A, B, C, D or Fail) to public schools. It does seem that turnabout is fair play, and the nation gets a chance to give a grade, just like schools give grades. The public rates schools as favorably in 1985 as in 1984 — when the schools received the highest grades for performance in a decade. In 1985, 43 percent of the respondents gave public schools in their communities a grade of 'A' or 'B'. Only 14 percent said the public schools in their communities deserve a grade of 'D' or Fail.

As might be expected, those people closer to the schools give higher grades to their local institutions. Among respondents with children attending public schools, 52 percent gave their local schools a grade of 'B' or better. For respondents with no children in school, only 39 percent gave the local public schools a grade of 'A' or 'B'.

Respondents give schools in their own communities higher grades than they give public schools nationally. In 1985, 27 percent of the respondents gave the public schools nationally a grade of 'A' or 'B', compared with the 43 percent giving the public schools in their local communities a grade of 'A' or 'B'. That 27 percent may seem low, but people have always rated their local schools higher than schools nationally. And, since this question was first asked in 1974, this is the highest grade the public has given schools on a national level.

Almost half of all respondents (49 percent) gave teachers in the local public schools a grade of 'A' or 'B'. This percentage is up considerably from 1981, when only 39 percent of respondents gave local teachers an 'A' or 'B'. Parents of children in public schools were more likely to give an 'A' or 'B' to local teachers (58 percent) than respondents with no children in school (47 percent). A full 41 percent of respondents with children in nonpublic schools somewhat surprisingly gave public school teachers a grade of 'A' or 'B'.

The grades given to school principals and other administrators are similar to those given teachers. Almost half (48 percent) of all respondents gave principals and other administrators grades of 'A' or 'B'. Again, parents of public school children were more likely to give an 'A' or 'B' (56 percent) than respondents with no children in school (45 percent).

When parents were asked to grade the school their own children attend, the grades were considerably higher. Almost three-quarters (71 percent) gave their children's schools a grade of 'A' or 'B'. Parents are most obviously familiar with their children's school than with any others.

The poll included several other questions. For instance, one-third of the respondents say teachers' salaries are too low, with only six percent saying salaries are too high. (This view of underpaid teachers is held by those who do not have chidren in public schools, as well as by those who do.) The public tends to favor merit pay for teachers (60 percent support) and think teachers should be required to pass a competency test before being hired by a school district (89 percent).

The public also supports sex education in schools, contrary to claims by some lobby groups. Three-fourths of respondents think sex education should be taught in high school, and 52 percent think it should be included in elementary schools.

For our purposes, one significant item on the poll dealt with high school subjects. Respondents were given a card with a list of subjects and were asked: "Would you look over this card, which lists high school subjects. If you were the one to decide, what subjects would you require every high school student who plans to go on to college to take?"; followed by: "What about those public

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(Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district and currently is employed at the Illinois State Board of Education.)

school students who do not plan to go to college when they graduate? What courses would you require them to take?"

The results of these two questions are presented in Table 1. The subject is listed in the center of the table. On the right are the responses for those students who plan to go to college; on the left, responses for those students who do not plan to go to college. For instance, 91 percent of the respondents think all students planning to go to college should take mathematics, which is the first ranked subject in the poll. A smaller proportion (85 percent) think all students not going to college should take mathematics.

The subject of computer training is naturally of interest to us. (After all, you would not be reading THE RAINBOW if you were not interested in computers!) It is interesting to note that 71 percent think college-bound students should have computer training in high school, but only 57 percent think that students not planning to attend college should take computer training. Apparently 14 percent of the respondents see computer training as more important to students going to college than students without college plans.

Past polls did not include this subject, so we do not know whether public opinion toward computers in schools has changed in recent years or not. However, the importance placed on computer education by the general public is certainly impressive. Computer training ranks right below the "big four" (math, history, language arts and science). For perceptions of what noncollege-bound students should take in school, more people recommended computer training than science!

I must admit I was surprised when I first saw the information represented in Table 1. First, while I place a high degree of importance on the value of computers in education, I am not sure what the people responding to this survey consider "computer training" to be. I do think that people living in the 21st century should be computer literate, but that does not equate in my mind to computer training. Of even greater importance, I wondered why nine percent of the people did not think all students should take mathematics, why 12 percent did not think students should take English, and why nearly a quarter of the public (24 percent) does not recommend students take history or science!

Polls and surveys often raise disturbing questions as well as provide answers. And, of course, there are some questions that cannot be answered by polls. Even so, you may wish to conduct your own local poll. No matter what you find, the results will be interesting and useful.

If you do want to conduct your own poll, you are welcome to use the same questions asked in the Gallup Poll. The questions are not copyrighted, and neither is any information from the national poll. (Naturally, credit to the source should be given, and you should be very careful to maintain accuracy and completeness of quotes.) If you want more information about how to conduct a small poll, contact me for details. My address is 829 Evergreen, Chatham, IL 62629. ☐

Table 1

Students planning to go to college			Students not planning to go to college	
Rank	**Percent**	**Subject**	**Rank**	**Percent**
1	91	Mathematics	1	85
2	88	English	2	81
3	76	History/U.S. Gov't.	4	61
3	76	Science	7	51
4	71	Computer training	6	57
5	59	Business	5	60
6	57	Career education	6	57
7	53	Foreign language	10	17
8	48	Health education	8	43
9	40	Physical education	9	40
10	27	Vocational training	3	75
11	24	Music	11	15
12	23	Art	11	15

Educational Programs

? Questions ??

Questions — ***a powerful, easy to use, authoring program!*** **Questions** has as many uses as its owners have creativity. Teachers have used **Questions** to develop pre and post tests, to make copies of the same test with questions in a different order, and to review and reinforce difficult lessons with their students. But **Questions** is not limited to school uses. Enterprising people have found other uses for it. Party-givers have used it to personalize games for baby and wedding showers, and for creating their own trivia games. Administrators have used it for inservice training. Children have written their own riddles with it. If you own **Questions**, you'll find a way to use it. You will also be pleased with its many fine features:

★ Word processing commands that allow you to make changes as you type
★ Screen commands so you do not have to constantly refer to the manual
★ Options to take the quiz on the computer or to print a hard copy of it
★ Sequential or random presentation of questions
★ The ability to print the same test with questions in a different order
★ The printing of an answer key
★ The option to use expanded printer lettering to create large print tests.
★ The ability to save quizzes to cassette or disk
★ A review feature which permits students to study questions that have been missed
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★ Multiple choice, true/false, or fill in the blank formats.

Questions is truly a professional authoring program that meets the needs of all of its users.

16K ECB - Cass. $19.95
32K ECB - Cass. $24.95
32K Disk - $26.95

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Reading Comprehension Series
Grades 2 - 4

B5's **Reading Comprehension Series** is a set of data files to be used with the **Questions** program described above. Each file contains over 100 questions, organized into 6 to 8 sequential lessons. Lessons build from simple to complex. This series emphasizes the thinking aspect of reading. Simple sentence structure allows the student to concentrate on thinking skills.

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THE SAILOR MAN

TAPE $29.95
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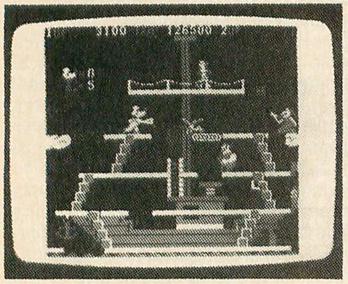
GAMES

Requires 64K Machine Language

The first screen objective is to catch enough of Elsie's kisses (those Red Heart Shaped Things) to fill in the squares on the Sailorman's house. If you can time your punch just so, you can send the punching bag over to knock the bucket down and, with a little bit of luck, right on **Bigfatbadguy's** head. This will give you a little (but not much) time to catch all those RHSTs.

You must avoid contact with **Bigfatbadguy** who is actively pursuing you. You must also be careful of **Olduglyseawoman** who will appear at higher difficulty levels to chuck empties at you. Either avoid the flying bottles or punch them (with the fire button) to keep from being knocked into the water.



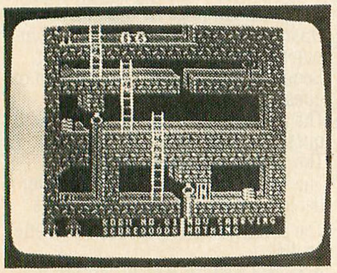
The second screen objective is to collect enough notes to play Elsie a little love song. You may jump off and onto the other end of **Fatguyeatinghamburger's** teetertotter to fly up a deck and even two decks if you manage to catch hold of **Smartaleckkid's** grab handles. Time it right and away you go.

The Third screen objective is to collect enough letters (thrown by Elsie's cries for H-E-L-P) to complete a ladder all the way to the crow's nest where Elsie is calling you. Beware of the Crow, however, who thinks you are after her eggs!

On all screens, eating a can of collard greens (labeled "S" for Collard and grasped by punching the can just right) will give you amazing speed, strength and ability and allow you to send **Bigfatbadguy** into the drink with a single punch.

DRAGON SLAYER

NEW



Save the villagers of Pendor! They live in fear of Icarus, the blood thirsty dragon. The dragon lives in a cave, way up in the mountains. The cave is a treasure chest, full of gems and cashbags. The trail to the cave is as menacing as Icarus himself. Outstanding graphics throughout. 160 screens of exciting action packed arcade excitement.

32K **Disk $29.95**

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SR-71	**32K**	**FANGMAN**	**16K**
Tape 28.95	**Disk $31.95**	**Tape $24.95**	**Disk $27.95**
DRACONIAN	**32K**	**KATER PILLAR II**	**16K**
Tape $27.95	**Disk $30.95**	**Tape $24.95**	**Disk $27.95**
MS. MAZE	**32K**	**WAREHOUSE MUTANTS**	**16K.**
Tape $24.95	**Disk $27.95**	**Tape $24.95**	**$Disk $27.95**

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EDUCATIONAL

FACTPACK

FACTPACK is a set of 3 programs designed for home or school use. The programs provide drill and practice with basic addition, subtraction, multiplication and division facts and are appropriate in grades 1-6. Each program requires a 32K Extended BASIC Color Computer. Disk drive and printer are optional.

Requires 32 K Ext. Basic **Tape $24.95** **Disk $29.95**

TEACHER'S DATABASE II

DISK ONLY
64K Req.

Teachers' Database (TDB) is a program designed to allow a teacher to keep a computerized file of information about his/her students.

The program requires a 64K Color Computer and at least one disk drive. This completely revised program includes all of the capabilities of the original TDB plus many new features.

NEW

- Information on as many as 100 students, or more, may be in the computer at one time.
- Each student may have as many as 20, or more, individual items of data in his/her record.
- The program has many easy to follow menus.
- Records may be easily changed, deleted, or combined.
- Information about students may be numerical or text.
- Records may be quickly alphabetized or reordered based on their contents.
- Records may be sored by various criteria.
- A full statistical analysis of scores may be done and sent to the printer.
- Student test scores may be weighted, averaged, changed to a percentage or changed to a letter grade.
- Individual student progress reports and class gradebook sheets may be printed.
- Three methods of data entry spped the task of typing in student grades and test results.
- The program may be easily customized to work with any printer.
- Student seating charts may be created and printed.
- Graphs of student test results may be created using the computer's high resolution graphic screen.
- Grade distribution can be displayed numerically or as a histogram.

64K TDBII $59.95 • 32K TDB Version - DISK $42.95 TAPE $39.95

VOCABULARY MANAGEMENT

Requires 16K Ext. Basic or 32K for printer output.

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 11 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

- As many as 300 vocabulary words and definitions may be in the computer's memory at one time.
- Words and definitions may be saved on disk or tape.
- Remarks and/or comments can be saved with word files.
- A disk loading menu allows students to load disk files without typing file names.
- Word lists may be quickly alphabetized.
- The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.
- The printer segments allow full use of your printer's special features.
- The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

TAPE $39.95 **DISK $42.95**

FRACTIONS - A Three Program Package

MIXED & IMPROPER

1. Review converting mixed numerals and improper fractions.
2. Practice converting mixed numerals to improper fractions.
3. Practice converting improper fractions to mixed numerals.
4. Practice of both types. (Mixed to improper & improper to mixed)
5. Review converting mixed numerals to mixed numerals. (Used in regrouping in substraction).
6. Practice converting mixed numerals to mixed numerals.

EQUIVALENCE

1. Definitions of terms and review of finding equivalent fractions.
2. Practice finding equivalent fractions.
3. Practice finding sets of equivalent fractions.
4. Review of dinding if one fraction is equal to, not equal to, less than or greater than another.

LOWEST TERMS

1. Review of placing fractions into lowest terms by dinding the greatest comon factor (GCF) of the numerator and denominator.
2. Practice finding the GCF of pairs of numbers.
3. Practice placing fractions into lowest terms by finding the GCF of the numerator and denominator.

32K EXT BASIC **TAPE $30.95** **DISK $35.95**

MATH DUEL

MATH DUEL is a challenging mathematics game that pits you against the computer in a game of wits. You must use all of your knowledge of factors, multiples and prime numbers to develop a strategy that allows you tog ather more numbers and thus more points than the computer.

The game is deceptively simple. you select the size of the playing field that is composed of from 8 to 100 numbers. You must then choose numbers that will give you the maximum number of points and the computer the least number of points. There are only 6 rules.

32K EXT. BASIC **TAPE$24.95** **DISK $29.95**

SIMULATIONS

P51 Mustang
Attack Flight
Simulator

JUST IMAGINE! Your movements are shown at any remote CoCo across town or across the country. It's hard to believe it's simulation.

P40 shown.

P51 Mustang

Attack Flight Simulator

Experience the ultimate video experience. For the first time ever, two computers can be linked together with action and re-action at at either location, or play alone. The P-51 Mustang was the attack workhorse during WWII. To experience the flight of this beautiful plane in actual combat situation will give many hours of excitement. You can test your skill against the computer to defend your position or try your hand competing against your opponent at any remote location. Two CoCo's can be linked by cable for **TRUE** two-player adventure. With the use of a modem you can test your skill across town or across country!! (Each individual needs a copy of the program.) This program is another first from Tom Mix Software. Order your excitement today. Direct cable available separately for using two computers at the same location.

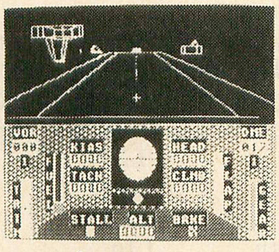
32K Machine Language Tape $29.95 Disk $34.95 Cable $10.95

Worlds of FLIGHT

Jump in the pilot seat - not a game - A realistic Flight Simulation

"World's of Flight is the best out-the-window simulation available for the CoCo". Dr. Scott L. Norman, Hot CoCo, Dec. 1984.

Worlds of Flight (WOF) is a machine language, real-time flight simulation (of a sophisticated ultra-light aircraft). The program is available on DISK but was specifically designed to bring unprecedented detail and power to CASSETTE systems. WOF generates panoramic 3-D views of ground features as the pilot flies within one of nine different "worlds". Instrument flight capability has been provided along with some aerobatic performance. The simulation models over 35 different aircraft and flight performance parameters including winds and cloud ceilings. Sound effects have been faithfully reproduced to provide an even greater sense of realism. A 25 page light manual explains the instrument panel, the basis of flight control, instrument navigation and even walks the pilot through a take off / landing sequence about the airport. Complete with charts bound in an attractive binder, the entire WOF package challenges you to find a more advanced flight simulation for **any computer**... You simply can't! If you are a serious simulation buff this one is for you!



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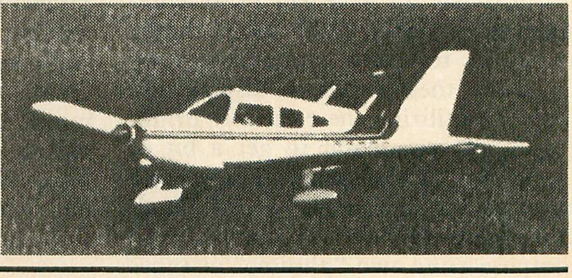

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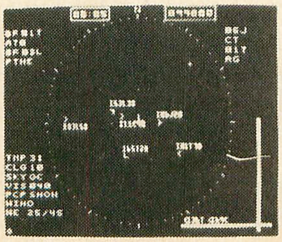

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TAKING BASIC TRAINING 16K ECB

The Beginning Musician's 'Tin Ear Lament'

By Joseph Kolar
Rainbow Contributing Editor

This session is dedicated to the CoCo enthusiast without a musical background. Beginners with tin ears will profit.

CoCo has an excellent `PLAY` command in Extended Color BASIC that is a mystery to many newcomers. They throw up their hands in dismay and revert to utilizing the relatively primitive `SOUND` command to get a bit of sound into their programs. I have good news for the newcomer to CoColand. You *can* utilize the `PLAY` command and compose your own "phrases" or tunes to accent various parts of your programs. It will also be helpful at this time to review the chapter on `PLAY` in your manual.

Although not vital, you are urged to purchase a pad of graph paper with four squares to the inch. You will find quad-ruled paper an aid when you are laying out graphics designs. If you do not have graph paper, you may rule out the required shapes necessary for this tutorial on blank paper. The dimensions will be in inch units to enable you to easily follow instructions.

(Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.)

Lay the 8 by 10½-inch sheet on its side, and 1 inch from the top and 1½ inches from the left edge, draw an 8-inch line on top of the nearest graph line. Draw a parallel 8-inch line ½ inch below the first line. Rule a ½-inch line at each end connecting the two 8-inch lines to create an oblong shape. Make four more identical shapes underneath, maintaining a ¾-inch vertical space between oblongs. Divide each oblong into 1-inch segments with a ruled line. If you are using a blank sheet of paper, further divide each 1-inch section into four ¼-inch parts (see Figure 1). You have just created the work area upon which you will create whatever sounds are pleasing to you.

Now, hear this! We will use the key of 'C'. This means we will not contend with any sharps or flats. We will use:

Note	Code	Space
Half	L2	8
Quarter	L4	4
Eighth	L8	2
Sixteenth	L16	1

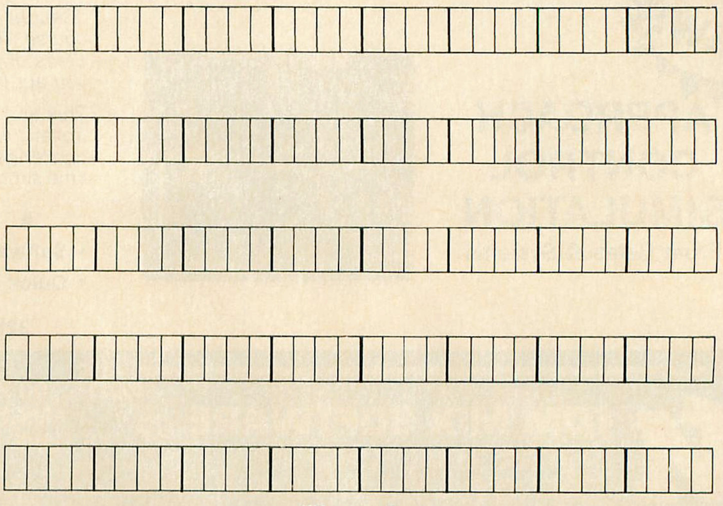

Figure 1

We will raise or lower the volume in five-unit increments: V25, V20, V15 and V10. We will use two octaves, O2 and O3, and a pause between notes, P4.

The notes in an octave begin with 'C' and parade up to 'B' in the following order: C, D, E, F, G, A and B, and hop up to the next octave and repeat C, D, etc.

To review: To create interesting sounds and quasi-music, we will use octaves O2 and O3, and use a volume of V25, V20, V15 and perhaps V10. We will use notes L2, L4, L8 and L16 and the pause P4. This is not to preclude you from using the whole range in each category. Therefore, we will merely use the bull's-eye portion of each option.

What makes an interesting series of sounds? To maintain interest, it is nice to go up and down the scale. It is also nice to lengthen and shorten the time interval in a group of notes. It adds variety to run up and down the octaves, and finally, it gives the whole composition a little zest to vary the volume from time to time.

Rest assured that the little tune, "Tin Ear Lament," was created without changing any notes. Whatever came to mind was entered into CoCo and then onto the work sheet. Each program line was keyed and checked out. If it sounded OK, we advanced to the next segment.

The idea was to fill each oblong with notes and pauses. Pay close attention to the explanation. You will agree, even though the "Lament" is homemade, for us non-musicians it has an assortment of sounds. This song is just a demo to stir your creative juices. When you are finished, you will surely want to create a string of sounds using the `PLAY` statement for your programs.

Each one of the segmented oblong boxes you prepared are considered to be one line of music. The object is to fit notes into each oblong to make a complete unit. Here are the rules to follow in this tutorial:

A half note takes up eight spaces (two segments of an oblong); a quarter note takes up four spaces (one segment); an eighth note takes up two spaces (½ segment); and the sixteenth note takes up one space (¼ segment). The notes are indicated in the oblong by drawing a vertical boundary line for each note.

Now, fire up your panting CoCo! The first line of music will be four eighth notes, C, D, E and C. Since each eighth note requires two spaces, add a vertical line in pencil after the second space. The fourth and eighth spaces are the ends of the first two segments (see Figure 2). Enter in pencil the four notes we chose into each successive compartment so they are centered over the line in the middle of each compartment (see Figure 3).

To indicate how loud we want the notes to be sounded, we must choose a volume level. We chose V20 so that the sound is fairly loud. Since there are only two of the five octaves we are using, we settled on the higher one, O3 (remember, it is the letter 'O', *not* a zero). Place these two options above and to the left of the first note. Place the 'V' value first, followed by the 'O' value (see Figure 4). Please do not copy Listing 1 at this time.

We are ready to create our first `PLAY` program line. Key in:

```
2 CLS
20 PLAY"V20O3L8CDEC"
500 GOTO500
```

Each `PLAY` line will be an even number in this tutorial. All the information we develop must be enclosed in quotation marks. The data will be consistently listed in the following order: volume, octave, length of note and note. Each program line will contain only notes of the same length.

If you are creating your own music, you should `RUN` and listen. If you do not like what you hear, change the notes and try something else. When it sounds OK, go on to the next segment.

To make it sound interesting, note 'C' is followed by 'D' and then 'E'; each is slightly higher in pitch, then it goes back down to 'C'. Run the program lines and listen. Next, press BREAK and key in `40 PLAY"V15O2L4EF"`.

The idea was to lengthen the next notes, drop the volume and lower the pitch by going to a lower octave. Now run again. When played with Line 20 it sounded OK, so it was entered in the next spaces in the working oblong (see Figure 5).

Since L4, a quarter note, is four spaces (one segment) long, enter the note names covering the middle line in each segment. Every time the 'V' or 'O' is changed, indicate it directly over the left side of the first note involved.

The four notes in Line 20 sounded fine and it was decided to repeat them in a lower octave at the original volume level. Now key in `60 PLAY,"V20O2L8CDEC"`. Fill in your next work segment and compare it with Figure 6.

Note: If the 'V', 'O' or 'L' is unchanged from a preceding program line, it is not necessary to insert it in the following program line.

Run the program, then press BREAK and delete O2 from Line 60. Now run it again — see? I mean, hear?

There are two more segments left in this first oblong. To jazz it up, it was decided to fill in the balance of the oblong with sixteenth notes, lower the 'V' and raise the 'O'. F, A, C and E were tried and then reversed, E, C, A and F. Enter the information into the last two oblong segments and check against Figure 7.

Now key in `80 PLAY,"V15O3L16FACEECAF"`. Each note was placed in a separate box and the changed 'V' and 'O' were entered to the left, over the first note.

The oblong is completely filled. You should try to fill in all the boxes of an oblong so that it does not flow over into the next oblong. If you added an extra sixteenth note or deleted the last sixteenth note, it just doesn't sound right. If you have an extra space or two, you may use P16 or P8 to fill out the oblong with a slight pause.

Now run the program. It sounds interesting running up and down and changing the 'V' and 'O'. But, isn't it boring looking at a blank screen? To drum up some interest and use the BASIC graphics capability of CoCo, we could put in a bit of color to indicate the value of each note as it is being played. Let us practice using `POKE`. We will poke at a specific location, X (1263), the color value of note length.

```
3 X=1263 'POKE LOCATION
5 A=255 'ORANGE 16TH NOTE
6 B=159 'YELLOW 8TH NOTE
7 C=207 'BUFF 4TH NOTE
8 D=239 'MAGENTA HALF NOTE
```

Line 20 consists of eighth notes so we will add:

```
10 POKEX,B
```

Line 40 consists of quarter notes, so:

```
30 POKEX,C
```

Figure out and insert lines 60 and 80 and `RUN`. Don't forget lines 50 and 70. It might also look better to highlight the blocks, so add `4 POKE1262,128:POKE1264,128` and run the program.

On to the next oblong! F-A-C-E sounded pretty good, so for starters let's lower the octave and lengthen the value of the notes, keeping the same notes and volume level. Add Line 100 using the information in Figure 8. It should read: `100 PLAY"O2L8FACE"`. Satisfied with Line 100, we can add: `90 POKEX,B` and `RUN`.

To slow it down further, a half note, 'C', in a higher 'O'; 'V' remaining unchanged, is added. See Figure 9 and convert the information into a program line. It should read: `120 PLAY"O3L2C"`.

Note: A half note is eight spaces (two segments) long, so the 'C' is written over the line dividing the two segments. Did you notice that the volume isn't indicated above this and Figure 8 because it is unchanged? Now run the program. If this sounds OK, add the appropriate `POKE`: `110 POKEX,D`.

Then is was decided to raise the 'V' and shorten the notes. F-A-C-E sounded good before, so we decided to scramble them up (E-C-A-F). Write it in and check with Figure 10; if OK, create Line 140.

```
140 PLAY"V20L8ECAF"
```

After settling on these notes, add `130 POKEX,B` and `RUN`.

Since we have eight spaces left, it was decided to fill them with sixteenth notes, F-A-C-E. After the fourth note, it was decided to lower the volume a bit and repeat the same notes. Did you notice that since only the volume is changed and then only beginning with the fifth note the V15 is placed over the second 'F' in Figure 11? Now type in `160 PLAY"L16FACEV15FACE"` and add `150 POKEX,A`.

At this point, two oblongs are complete. Continue by keying in each even numbered program line, taking the information from Listing 2 and adding the odd-numbered line to show the correct color played. Complete the work sheet.

Look at Line 220 and notice that the last box has a pause of quarter note duration to fill the oblong nicely. Add `9 E=128 'ALL PAUSE DURATIONS. 128, (BLACK)` indicates "no sound." Do not insert Line 205 yet! See 'P' in Figure 12 and add:

```
220 PLAY"P4"
210 POKEX,E
```

Finish up the last two oblongs, comparing your work with the listing.

As a final fillip, it was decided to repeat the last part of the song. `FOR Q=1 TO 2` was tried in various parts of the program and sounded best before the pause. Add:

```
205 FOR Q=1 TO 2
390 NEXT Q
```

You may notice that Line 280 has O2 even though it was not changed since Line 200. It is harmless to add the redundant O2 provided it isn't changed. If you omitted the one in Line 280, faithful CoCo *still knows* what you had in mind.

Create your own tune in small units and run it until it sounds good to you. Then, add another section, being sure to vary the volume, notes, note length and run up and down the octaves. Use other octaves such as O1 and O4, and don't forget to make a work sheet. Be assured that whatever you compose, it will be an original tune that will be a vast improvement over anything you might have worked up using `SOUND`. You could also create smaller compositions to accent or enhance certain parts of your programs.

What do you say, Mozart? Make a new work sheet and give us your all! ☐

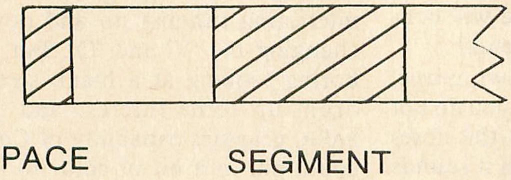

Figure 2

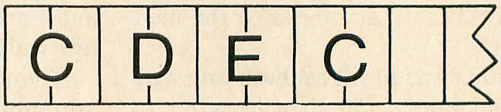

Figure 3

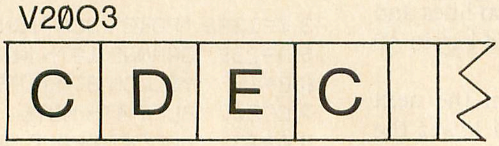

Figure 4

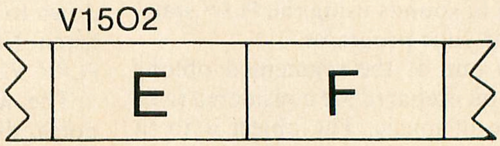

Figure 5

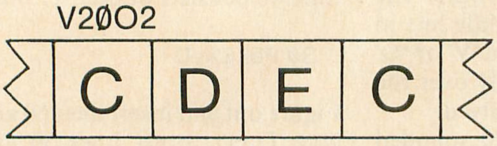

Figure 6

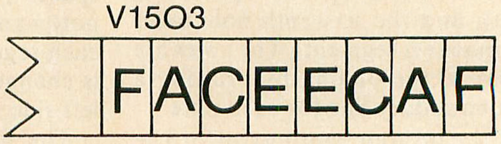

Figure 7

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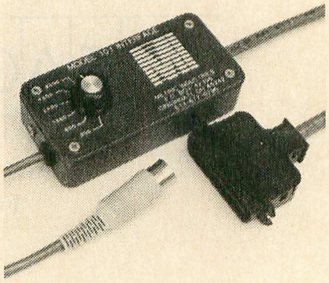
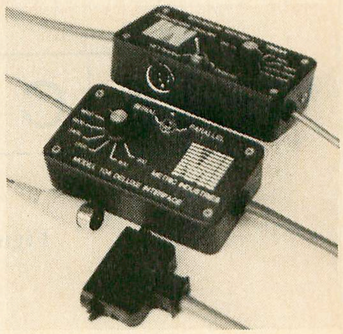


Model 104 Deluxe Interface $51.95

NEW

The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5" × 2.5" × 1.25" and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.



Model 103 Combo $68.95

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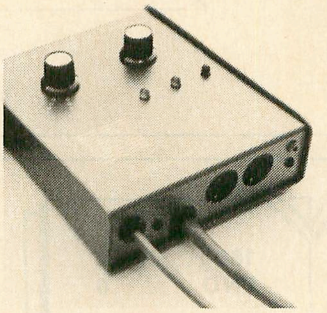

IMPORTANT!

THE 101, 103 AND 104 ALL REQUIRE POWER IN ORDER TO OPERATE. MOST PRINTERS CAN SUPPLY POWER TO YOUR INTERFACE. STAR, RADIO SHACK, AND OKIDATA ARE JUST A FEW THAT DO. EPSON DOES NOT. THE INTERFACES CAN ALSO BE POWERED BY AN AC ADAPTER (RADIO SHACK MODEL 273-1431 PLUGS INTO ALL MODELS). IF YOU REQUIRE A POWER SUPPLY, ADD A "P" TO THE MODEL NUMBER AND $5.00 TO THE PRICE. (MODEL 101P $44.95, MODEL 104P $56.95 AND MODEL 103P $73.95)

Model 102 Switcher $35.95

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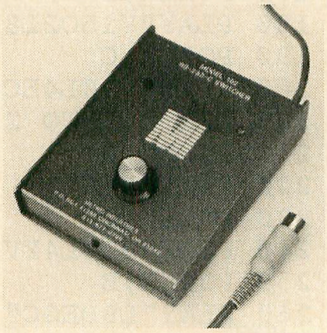

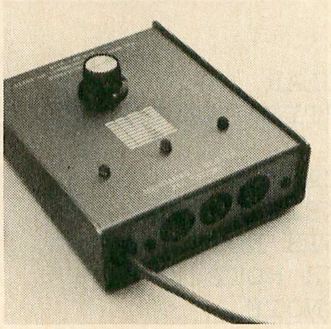

The Model 101, 102, 103 and 104 will work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty.**

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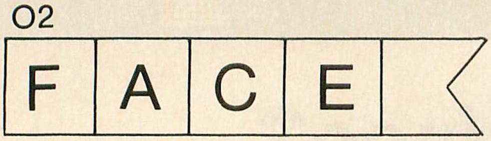

Figure 8

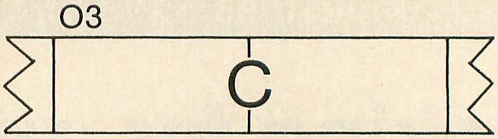

Figure 9

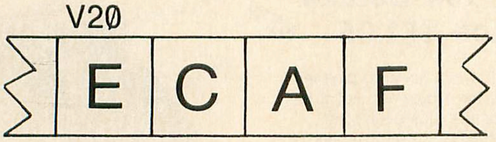

Figure 10

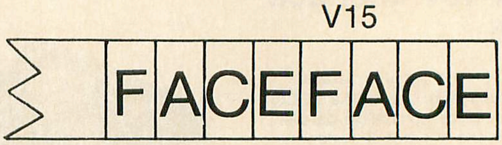

Figure 11

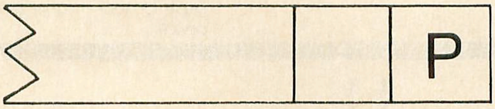

Figure 12

180 58
END 0

Listing 1: TIN EAR

```
0 '<LISTING1>
1 '(C) 1984, J. KOLAR
2 CLS:PRINT@ 137,"TIN EAR LAMENT
"
3 X=1263 'POKE LOCATION
4 POKE1262,128:POKE1264,128
5 A=255 'ORANGE 16TH NOTE
6 B=159 'YELLOW 8TH NOTE
7 C=207 'BUFF 4TH NOTE
8 D=239 'MAGENTA 1/2 NOTE
9 E=128 'ALL PAUSE DURATIONS
10 POKEX,B
20 PLAY"V20O3L8CDEC"
30 POKEX,C
40 PLAY"V15O2L4EF"
50 POKEX,B
60 PLAY"V20O2L8CDEC"
70 POKEX,A
80 PLAY"V15O3L16FACEECAF"
90 POKEX,B
100 PLAY"O2L8FACE"
110 POKEX,D
120 PLAY"O3L2C"
130 POKEX,B
140 PLAY"V20L8ECAF"
150 POKEX,A
160 PLAY"L16FACEV15FACE"
170 POKEX,B
180 PLAY"V15O2L8ECAFO3FA"
190 POKEX,C
200 PLAY"V10L4ECO2GE"
205 FOR Q=1 TO 2
210 POKEX,E
220 PLAY"P4"
230 POKEX,C
240 PLAY"V20L4FV15AV10CV15E"
250 POKEX,B
260 PLAY"L8DEGC"
270 POKEX,A
280 PLAY"O2L16GGAAGGEV15C"
290 POKEX,B
300 PLAY"V20O3ED"
310 POKEX,A
320 PLAY"V25L16CO2BAGBAGO3C"
330 POKEX,B
340 PLAY"V20L8ED"
350 POKEX,C
360 PLAY"V15L4CO2A"
370 POKEX,D
380 PLAY"V10L2C"
390 NEXT Q
```

230 176
END 42

Listing 2: KOLAROLA

```
0 'KOLAROLA
10 '(C) 1984, J. KOLAR
30 PMODE2:PCLS:PMODE4
40 A=170:B=106:P=1.7
50 DIM B(2), D(2), F(2), H(2), I
(2), J(2)
61 DRAW"BM14,0D4"
63 DRAW"BM38,4L4"
65 DRAW"BM54,8U4"
67 DRAW"BM70,4R4"
68 DRAW"BM80,0F8BU8G8"
69 CIRCLE(94,4),1,1:CIRCLE(94,4)
,3,1
71 GET(10,0)-(18,8),B,G
73 GET(30,0)-(38,8),D,G
75 GET(50,0)-(58,8),F,G
77 GET(70,0)-(78,8),H,G
78 GET(80,0)-(88,8),I,G
79 GET(90,0)-(98,9),J,G
90 PCLS:SCREEN1,1
105 FOR R=80 TO 24 STEP-8
110 FOR Z=2000 TO 1538 STEP-33:C
=P*Z-R
120 C=C+P^2/180
222 X=INT(A-6+R*COS(C-.6)):Y=INT
(B-6+R*SIN(C-.3))
225 PUT(X-40,Y-10)-(X-32,Y-2),B,
NOT
230 PUT(X-40,Y-10)-(X-32,Y-2),D,
NOT
235 PUT(X-40,Y-10)-(X-32,Y-2),F,
NOT
240 PUT(X-40,Y-10)-(X-32,Y-2),H,
NOT
242 PUT(X-40,Y-10)-(X-32,Y-2),J,
PSET:SOUND45,1:NEXTZ
254 FORQ=1TO 5:PUT(X-40,Y-10)-(X
-32,Y-2),J,PRESET
255 PUT(X-40,Y-10)-(X-32,Y-2),J,
PSET
256 SOUND10,2:SOUND100,1:NEXTQ:N
EXTR
257 FORQ=1TO200:NEXT:PLAY"V20O3D
DL8EEL16FACEL8AAL32FL16FEL8DEP8V
25L16GBO4DO3DBDCCL4EEV15DCL2P2V2
0L16FACEL8FACEL16FACEL4EDL2CV15O
1BABO2CEFGL16GGDDEEO1BBL8O2CCDCL
2DCC"
260 FORQ=1TO1000:NEXT:GOTO90
```

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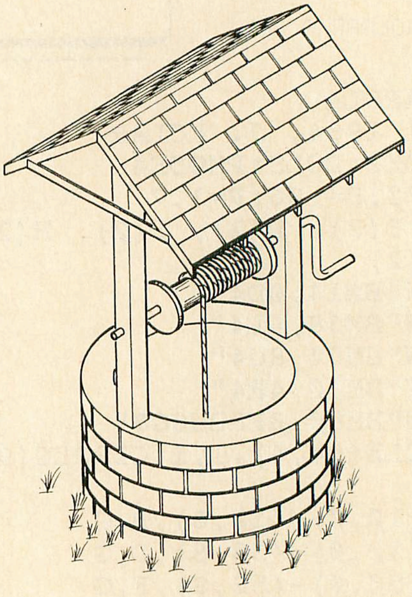
A Simulation of Life Skills



By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget that this is BASIC. All programs resulting from your wishes are for your use but remain the property of the author.

When the movie *2001: A Space Odyssey* came out in the late '60s, many people had not come into direct contact with a computer. *2001*'s computer, Hal, with his big red eye, gave these movie viewers the impression that a computer could simulate many of the functions of a human, or better still, the environment and conditions that humans operate in. It is little wonder as personal computers have made their impact more greatly felt on society that individuals still expect them to offer the ultimate in both entertainment and education: the Simulation.

(Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

Many Simulations have appeared in the pages of THE RAINBOW. This month, the "Wishing Well" starts what I hope to be a series of Simulations that will appear at various stages throughout the year. They will be "Life Skills" Simulations. They will cover a variety of life skills that will be of value to students both at home and in school. As always, the direction of these Simulations depends on your suggestions and needs.

The Wish

An awful lot of my mail has recently been in the form of "thank yous" instead of requests. Often letters will say, "... thanks for not forgetting the MC-10 or the 16K Color BASIC models!" Quite frankly, where else but in THE RAINBOW or with a machine like a CoCo could you meet such a wide variety of needs so easily?

These comments can easily be translated to wishes for the "Well." Working in a classroom with special needs students serves as fertile ground for ideas for Simulations. This first Life Skills Simulation deals with one such skill that is rarely presented to students in a fashion they can easily relate to or apply.

The Program

The title of this program is *Subtraction Skills.* Its idea is to take names, products, prices and cash on hand, and have students make decisions on their use in a given situation. Many of my own students work on subtraction, but many times have difficulty figuring out when to use this skill, or how to correctly apply it to a given situation. For example, John has $15 in cash. How much change will he get if he spends $12.95 today? Some of my students will approach a problem like this and say, "Do I add or take away?" If they do know that they have to "take away," they often are not sure of which number to put on top and which number to put on the bottom.

Therefore, in designing this Simulation, I have tried to create a number of situations that a student might find while shopping for everyday items. The items may range from albums and tapes to clothing. Each situation involves a different person's name and a different amount of money. The easiest level always keeps quantities singular instead of plural. As the difficulty levels increase, the amounts of money used also increase.

The reason for this variety is quite obvious. Students get bored with the same activity if the conditions remain the same over and over again. That is why this quiz offers a number of different questions and tests two skills at the same time. For example, a problem presented may read:

> Steve has $8.64 in cash. The disks he wants cost a total of $5.56. Does Steve have enough money to buy the new disks? (Y)es or (N)o

As a result, the first question the students must answer is a determination of whether or not the person has enough money to make the purchase. Depending on the circumstances and student response, there are four different responses the computer will give to the answer that is entered.

As mentioned earlier, sometimes the problems may be just the opposite and read:

> Sally has $9.76 in cash. The tapes she wants cost a total of $15.56. Does Sally have enough money to buy the new tapes? (Y)es or (N)o

In this case, the student's response is "no," and the computer's response is based on whether or not the input is correct.

In cases where the individual has enough money, the screen will next ask: How much change will Steve get? In cases where the individual does not have enough money for the purchase, the screen will ask: How much more money does Sally need? The computer waits for the response and indicates whether or not the response is correct. As you can see, we are dealing with subtraction in two different circumstances. Many times students will not grasp that the same skill can be used for more than one task.

After completion of a problem, the program presents another new problem for the user to tackle. The first thing you will notice is that *Subtraction Skills* does not have the student do all the work on the screen. A paper and pencil are required to do the actual calculations for each response. This is especially important since many students are starting to rely too heavily on mechanical devices to do simple math calculations.

Granted, some people could choose to use this Simulation with a calculator. If your goal is to help your youngster learn how to use a calculator, then this Simulation will help. If your goal is to sharpen subtraction skills, it will do that, also. As you can see, this program can be pretty flexible in that regard.

Running the Program

Subtraction Skills fits in a 16K Extended CoCo without having to `PCLEAR` any extra memory. Therefore, it will fit into a 16K BASIC CoCo without any difficulty. I have also made sure to write out any BASIC key words that do not appear in MC-10 BASIC, such as `ELSE` or `STRING$`. The program is not small enough to fit into an MC-10 without the 16K expansion port, however.

On running the program, our new title screen appears, and the user is asked to select a difficulty level from one to nine. Nine is the most difficult while Level one gives only singular quantities with dollar totals under $10. Next the screen will ask:

```
ALLOW HINTS? (Y/N)
```

This hint option, if used, restates the problem before the input of the answer (i.e., 17.56 - 3.49). Since some students have difficulty determining which number goes on top, this helps with developing this skill. As a student progresses, you can later have the quiz run without allowing the hints. This allows the program to grow with the student.

Any time you wish to check a student's progress, you may press the '@' key. This shows the score card. The first line shows the number of problems completed. The next two lines show correct responses and incorrect responses. Since each problem has two questions asked, your screen may read:

```
PROBLEMS COMPLETED=20
CORRECT RESPONSES=38
INCORRECT RESPONSES=2
```

Do not let this confuse you. (Some might ask, "How can I have 38 correct if I only did 20?) I trust you see what this means based on my explanation.

You are given a total score and asked if you would like another try. Pressing 'Y' reruns the program while pressing

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'N' ends it. A new feature is the "continue" option, which is obtained by pressing the letter 'C'. The '@' key can be pressed at any time in the program so you can check your work, yet still return to where you left off. Pressing 'C' also repeats the same question if you have not completed it yet. This may cause some confusion in the score card since some questions will be answered twice, while the number of problems completed will not look correct. Don't let this bother you. The numbers are accurate if you keep this in mind.

One of the features I put in this program is one that appeared in last month's *Math Miner* educational Adventure. I have rewritten the INPUT command using INKEY$ so the CLEAR key is effectively disabled without getting into any machine language POKEs. Let me assure you, nothing is more frustrating to a student than hitting the CLEAR key during an INPUT statement. This routine helps prevent this type of needless aggravation.

Conclusion

Let your youngster or students try *Subtraction Skills*. If he or she is in need of remediation or training in these skills, this Simulation provides a new way of approaching them. As always, I await your suggestions as to what other skills you might like to see covered in this new Life Skills series of programs. Your suggestions can help us create a library of useful programs that "Wishing Well" readers are bound to treasure. See you next month. ☐

```
90 ........46
180 .......17
275 ......254
375 ......112
475 .......69
END ......85
```

The listing: SUBTRACT

```
10 REM***************************
15 REM* LIFE SKILLS SIMULATION *
20 REM*   SUBTRACTION SKILLS   *
25 REM*    BY FRED B.SCERBO    *
30 REM*     60 HARDING AVE     *
35 REM*  NORTH ADAMS,MA 01247  *
40 REM*   COPYRIGHT (C) 1985   *
45 REM****************************
50 CLS0
55 FORI=1TO32:PRINTCHR$(172);:NE
XT
60 FORI=1TO192:READA:PRINTCHR$(A
+128);:NEXT
65 FORI=1TO32:PRINTCHR$(163);:NE
XT
70 DATA109,104,96,109,104,100,11
0,108,106,109,108,109,,30,28,26
,29,,30,20,30,20,30,16,20,30,,2
1,28,29
75 DATA101,,101,,106,96,104,10
1,,100,,26,,24,21,16,22,16,,26,
,26,,16,26,,21,,20
80 DATA101,,101,,107,106,96,10
1,99,98,,,27,19,18,21,22,16,,,26
,,26,,16,26,,21,19,19
85 DATA101,,101,,106,104,,101,
,,,,,26,21,20,18,,,26,,26,,16,2
6,,,,21
90 DATA101,,106,101,,,106,,,101,
,97,,16,26,,26,21,,20,18,,26,,26
,21,16,26,21,21,,21
95 DATA103,99,106,103,98,97,107,
,,103,99,103,,,27,19,26,23,18,,2
7,17,27,17,27,23,17,27,23,21,19,
23
100 PRINT@293," COMPUTER  SIMULA
TION ";
105 PRINT@325,"  SUBTRACTION SKI
LLS  ";
110 PRINT@357,"   BY FRED B.SCER
BO   ";
115 PRINT@389,"  COPYRIGHT (C) 1
985  ";
120 PRINT@453,"  SKILL LEVEL  (1
-9)  ";
125 X$=INKEY$:IFX$=""THEN125
130 W=VAL(X$):IFW=0THEN125
135 PRINT@453,"  ALLOW HINTS? (Y
/N)  ";
140 X$=INKEY$:IFX$="Y"THEN155
145 IFX$="N"THEN160
150 GOTO140
155 DL=1:GOTO165
160 DL=0
165 CLS0
170 Z=500
175 DIMA$(40),B$(10):FORI=1TO40:
READA$(I):NEXT:FORI=1TO10:READB$
(I):NEXT:X=RND(-TIMER)
180 CLS0:Q=RND(10):P=RND(40):IFP
>20THEN SX$="SHE"
185 FD=0
190 IFP<=20 THEN SX$="HE"
195 X=INT(RND(Z))*W*2:A=X/100
200 Y=INT(RND(Z))*W*2:B=Y/100
205 CL=INT(RND(15)/2)
210 N$="##.##"
215 CLS0:PD=PD+1
220 GOSUB525:PRINT" "A$(P)" HAS
";:PRINTUSING"$##.##";A;:PRINT"
IN CASH."
225 PRINT" THE ";B$(Q);:IFW=1THE
N235
230 PRINT"S";
235 PRINT" ";SX$;" WANTS COST";:
IF W>1THENPRINT" A"
240 IF W=1THENPRINT"S A"
245 PRINT" TOTAL OF ";:PRINTUSIN
G"$##.##";B;:PRINT". DOES ";A$(P
)
250 PRINT" HAVE ENOUGH MONEY TO
```

QT STEALS THE SHOW!!

QT steals the show at Microware's OS9 Seminar!!! There were more QT's at the seminar than any other computer! The QT was everywhere. Microware used one for registration. The OS9 Users Group used two. Other companies used them to demonstrate their software. The QT has become THE computer for OS9/68K!

FHL announced five new products at the OS9 Seminar:

QT 20 - 68020 based computer system. The **QT 20** is based on the powerful 68020 microprocessor. The **QT 20** is a full 32 bit computer with 2048K RAM running at 12.5 mhz. Two **QT 20** prototypes were being shown with production expected to begin in late December 1985. Price for a **QT 20** with a 20 meg hard disk is 5195 without software and 6995 with software. Send for more details.

Mint^tm Dental Office System. **Mint**^tm combines the **QT** computer with FHL's Dental Office software to create the most powerful and cost effective system available today. **Mint**^tm provides Multi-User power at PC prices. Complete systems start at 9,995. Send for complete brochure with sample reports.

FHL Office System with QCom. The **FHL Office System** is a large group of programs written in Sculptor+ for OS9/68K. They include: Invoice/Point of sale, Purchase Order with mini inventory, Mailing List System, Phone Date File, Multi-Key Card file, Notebook, and Tri-File sales lead package. The system sells for $1,700 but is included with the QT along with the Sculptor+ runtime,which sells for $175. **QCom** is a communications program with XModem file transfer that sells for $150 by itself, but it is also included with each QT.

Sculptor+ Microprocessor Developments Ltd. and FHL have made the **Sculptor+** Software Development System available for OS9/68K. The development was done on FHL's QT computer system, (of course). **Sculptor+** offers automatic program generation, a query program and development menu. The system sells for $995 unless you own a QT. QT owners can get **Sculptor+** for only 695! Send for details.

QT Certified Developer Program. This program is intended for software programmers who plan to develop QT applications with the QT. The program offers these features: Special developer price for QT development systems, Free promotion to the 16,00+ readers of **'QT News'**, Access to inside information via the **'Developers Newsletter'**. Send or call for an **'QTCD'** application today, it's FREE!

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```
BUY THE"
255 PRINT" NEW ";B$(Q);:IFW>1THE
NPRINT"S";
260 PRINT" ?  (Y)ES OR (N)O"
265 GOSUB525
270 X$=INKEY$:IFX$=CHR$(3)THEN27
0
275 IFX$="N"THEN310
280 IFX$="Y"THEN295
285 IFX$="@"THEN530
290 GOTO270
295 IF A>B THEN PRINT" CORRECT!
";SX$;" HAS ENOUGH.":CR=CR+1
300 IF B>A THEN PRINT" SORRY! ";
SX$;" NEEDS MORE MONEY.":WR=WR+1
305 GOTO320
310 IF A>B THEN PRINT" SORRY! ";
SX$;" HAS ENOUGH.":WR=WR+1
315 IF B>A THEN PRINT" CORRECT!
";SX$;" NEEDS MORE MONEY.":CR=CR
+1
320 GOSUB525
325 IF B>A THEN 365
330 PRINT" HOW MUCH CHANGE WILL
";A$(P):PRINT" GET?";
335 IFDL=0THEN345
340 PRINT" (";:PRINTUSINGN$;A;:P
RINT"-";:PRINTUSINGN$;B;:PRINT")
";
345 PRINT"=> $ ";
350 GOSUB405
355 IF INT(C*100000+.5)=INT((A-B
)*100000+.5)THEN465
360 IF INT(C*100000+.5)<>INT((A-
B)*100000+.5)THEN485
365 PRINT" HOW MUCH MORE MONEY D
OES ";A$(P):PRINT" NEED? ";
370 IF DL=0THEN380
375 PRINT"(";:PRINTUSINGN$;B;:PR
INT"-";:PRINTUSINGN$;A;:PRINT")"
;
380 PRINT"=> $ ";
385 GOSUB405
390 IF INT(C*100000+.5)=ABS(INT(
(B-A)*100000+.5))THEN475
395 IF INT(C*100000+.5)<>ABS(INT
((B-A)*100000+.5))THEN495
400 END
405 Y$=""
410 X$=INKEY$:IFX$=""THEN410
415 IFX$=CHR$(13)THEN450
420 IFX$=CHR$(8)THEN440
425 IFX$="@"THEN530
430 IF ASC(X$)<13THEN410
435 Y$=Y$+X$:PRINTX$;:GOTO410
440 WW=LEN(Y$):IFWW=0THEN405
445 PRINTX$;:Y$=LEFT$(Y$,WW-1):G
OTO410
450 C=VAL(Y$):IFLEN(Y$)=0 AND X$
=CHR$(13)THEN405
455 PRINT:GOSUB525
460 RETURN
465 PRINT" CORRECT! ";A$(P);" GE
TS ";:PRINTUSING"$##.##";C:CR=CR
+1
470 GOTO500
475 PRINT" CORRECT! ";A$(P);" NE
EDS ";:PRINTUSING"$##.##";C:CR=C
R+1
480 GOTO500
485 PRINT" WRONG! ";A$(P);" GETS
 ";:PRINTUSING"$##.##";A-B:WR=WR
+1
490 GOTO500
495 PRINT" WRONG! ";A$(P);" NEED
S ";:PRINTUSING"##.##";B-A:WR=WR
+1
500 GOSUB525:PRINT" PRESS <<<ENT
ER>>> TO CONTINUE. ";:FORI=1TO30
0:NEXTI
505 FD=1
510 X$=INKEY$:IFX$=CHR$(13)THEN1
80
515 IFX$="@"THEN530
520 GOTO510
525 SQ=(143+(CL*16)):FORQS=1TO32
:PRINTCHR$(SQ );:NEXTQS:RETURN
530 CLS:PRINT:PRINT:PRINT
535 PRINTTAB(3)"PROBLEMS COMPLET
ED  = "PD:PRINT
540 PRINTTAB(3)"CORRECT RESPONSE
S  = "CR:PRINT
545 PRINTTAB(3)"INCORRECT RESPON
SES = "WR:PRINT
550 TR=CR+WR:IFTR=0THENTR=1
555 SC=INT(CR/TR*100)
560 PRINTTAB(3)"YOUR TOTAL SCORE
 = "SC"%":PRINT
565 PRINTTAB(3)"ANOTHER TRY (Y/N
) OR (C) ?";
570 X$=INKEY$:IFX$=""THEN570
575 IFX$="Y"THEN RUN
580 IFX$="N"THEN CLS:END
585 IFX$="C"THEN 595
590 GOTO570
595 IF FD=0 THEN PD=PD-1:GOTO215
600 IF FD=1 THEN 180
605 DATA SAM,TOM,MARK,BILL,HARRY
,WAYNE,DICK,DAVE,TORYN,MIKE
610 DATA JEFF,EDDIE,RAY,TODD,PET
ER,BRENT,SEAN,JASON,STEVE,PHIL
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QT Price List

	QT	*QT Plus*	*QT 20*
Single Board Computer level	995.00	1495.00	2750.00*
1 80 Track DSDD Floppy	1595.00	2095.00	-
2 80 Track DSDD Floppy	1750.00	2250.00	3900.00*
2 80 Track DSDD Floppy w/software	-	-	5700.00
10 meg Hard disk and floppy	2695.00	3195.00	-
20 meg Hard disk and floppy	2995.00	3495.00	5195.00*
20 meg Hard disk w/software	-	-	6995.00

*A version of the 68020 Motorola Bug monitor is the only software that is included with these systems.

Note: The *QT 20* is available with and without the software package that is included with the *QT* and the *QT Plus*. The individual prices for the software are below:

OS9/68K OS with all utilities	350.00
Basic09 and Runb	250.00
Stylo with Mail Merge and Spell check	625.00
Dynacalc electronic spreadsheet	595.00
QCom communications with Xmodem	150.00
Sculptor+ run time	175.00
FHL Office System	1700.00
Total separate cost	3845.00

The ***QT***, ***QT Plus*** and the ***QT 20*** w/software include the above.

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A Beginner's Hardware Course

Part 2

By Tony DiStefano
Rainbow Contributing Editor

Last month we took a look at binary bits and different numbering systems. So far, there doesn't seem to be any relation between these and computers. All we did is express numbers in different forms. But, we are a little closer to computers than you think. We know the computer is made up of a lot of chips that use bits of zeros and ones. In order to understand the ins and outs of these chips, I will go into detail of how chips use zeros and ones.

The heart of all digital computers is the logic circuit elements. They perform binary arithmetic operations, make logical decisions and perform operations such as counting and temporary storage. The basic type of logic element is called a "gate." Gates are circuits that look at two or more binary signals and produce a binary output, which depends upon the conditions of the input signals.

In order to comprehend this better, let's look at an equivalent circuit that is easier to understand, using conventional components you are likely to find around the house. If you want to build and test these circuits yourself, Radio Shack has all the parts. The switches are single pole, single throw. Any battery and bulb combination will do, just be sure the battery and the light bulb are the same voltage rating, otherwise you may end up burning out the bulb or get no results at all. Such a circuit is shown in Figure 2.

This circuit contains three components: a battery, a switch and a bulb. Here, the switch is considered the input and the bulb is considered the output. When the switch is on (a logical 1) the bulb is lit (this is also considered a logical 1). When the switch is off (logical 0) the bulb is off, also giving us a logical 0. In a logical element such as this, the input (the switch) and the output (the bulb) follow each other, one to one or zero to zero.

The symbol used to represent this circuit or logical element in a logic (or computer) schematic is shown in Figure 1a. This gate is called a "buffer." The input is exactly the same as the output. Not very useful in a logical sense, in that it does nothing, but it is needed under certain circumstances. For instance, when the output of a gate (logic element) is connected to many other gates, it may not have enough power to drive all the gates properly. In this case a buffer is used. Whenever a gate is used there is always a small delay between when the input changes and the output changes; a buffer is sometimes used just for that delay.

To continue our understanding of gates, let's introduce another factor in our battery circuit. Now study the circuit in Figure 3. It has two switches. The two switches are in a series, that is, one after the other. Therefore, they must both be on before the bulb will turn on. This circuit or logical element is known as an AND gate. The definition of an AND gate is: "The AND gate is a logical element with two or more inputs and a single output. Both (or all in the case of more than two) inputs must be binary '1' to produce an output of binary '1'."

The symbol for an AND gate is shown in Figure 1b. The main value of the AND gate is its ability to detect when all inputs are binary '1'. For example, in a control system when all the motors are on, turn on the extra generator. A quick way to remember this gate is, when 'A' AND 'B' are '1', then 'Y' is '1'. Hence the term AND.

(Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.)

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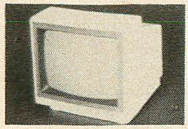

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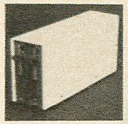

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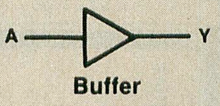
Figure 1

Symbol | Truth Table | Boolean Expression

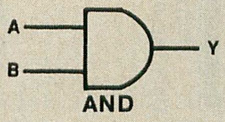
a



A	Y
0	0
1	1

$Y = A$

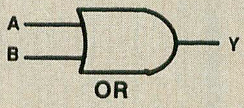
b



A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

$Y = A \cdot B$

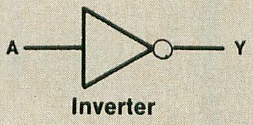
c



A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

$Y = A + B$

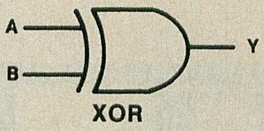
d



A	Y
0	1
1	0

$Y = \overline{A}$

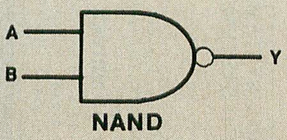
e



A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

$Y = A \oplus B$

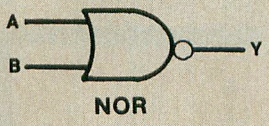
f



A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

$Y = \overline{A \cdot B}$

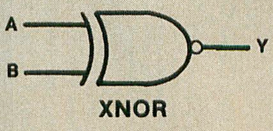
g



A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

$Y = \overline{A + B}$

h



A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

$Y = \overline{A \oplus B}$

The next gate we will study is the OR gate. Again, we have two switches in our next diagram, Figure 3. The difference is that now they are wired in parallel, one on top of the other. If either switch is on, then the bulb will be on. If both are on, the light is, of course, still on. This circuit or gate is known as an OR gate. The definition of an OR gate is as follows: "The OR gate is a logical element with two or more inputs and a single output. If any one input is a binary '1' then the output is binary '1'."

The symbol for an OR gate is shown in Figure 1c. The main value of the OR gate is its ability to detect when any input is binary '1'. An example of this use is when any door or window opens, an alarm sounds. A quick way to remember this gate is when 'A' OR 'B' is '1', then 'Y' is '1'. Hence the term OR.

If we look back to our first gate, the buffer, we notice the input matches the output. Since the input and the output are the same, it is called a "non-inverting" output. This gate, and most other gates, can also come in an "inverting" output. In the case of our buffer, it becomes an inverter, or better known as a NOT gate. Figure 1d shows the symbol of an inverter. The definition of an inverter is: "An inverter is a logic element whose output is always the complement (the opposite) of its input."

Notice the difference between a buffer symbol and an inverter symbol. The inverter symbol has a small circle on the output side. Any inverting output gate has a small circle on the output. This is true for the AND and the OR gate, too. If you take the output of an AND gate and tie it to the input of a NOT gate, the result (the output of the NOT gate) is an inverted AND gate (see Figure 5). This requires two gates and some wiring. It is so often used that the IC designers decided to put it all in one chip. This is called a NAND gate. The same thing goes with an OR gate — it becomes a NOR gate. These two gates are defined as follows: "NAND and NOR gates are the complements of AND and OR gates, respectively."

The last gate we will look at is the EXCLUSIVE-OR gate. The symbol for the EXCLUSIVE-OR gate is shown in Figure 1e. For short, this gate is called XOR. It is a little different than the OR gate and is used mostly when a signal needs to be inverted in some cases and not in others. The definition of an XOR gate is: "The logical XOR is defined as a binary '1' output when either of the

Figure 2

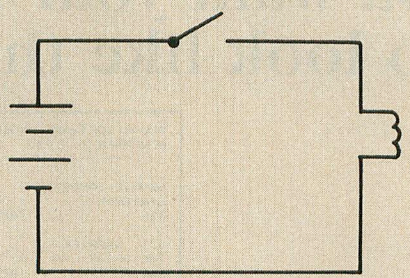


Figure 3

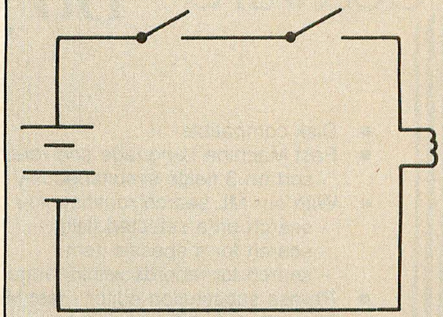


Figure 4

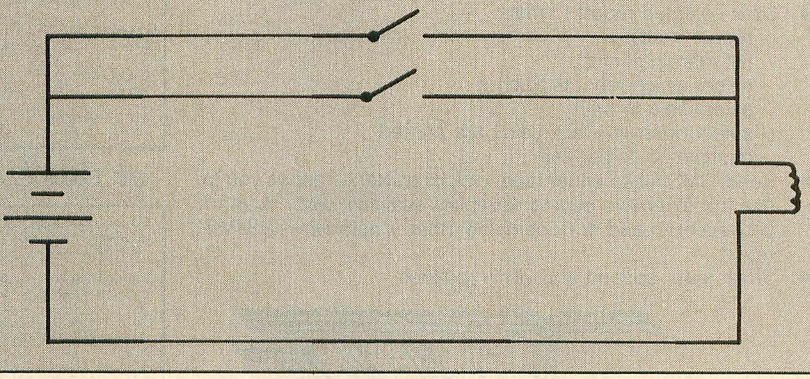
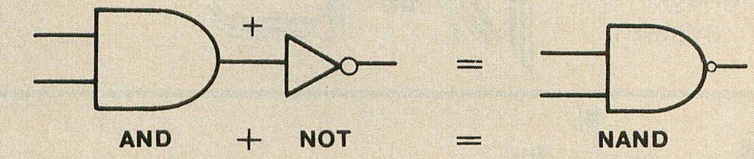


Figure 5



two inputs is a binary ‘1’. The other input being a binary ‘0’.”

A quick way to remember the function of this gate is when the inputs are different, the output is ‘1’. Like the other gates, it, too, has the inverted version. It is called the EXCLUSIVE-NOR or XNOR for short. The definition of an XNOR gate is the same as the XOR, but has its output inverted to a binary ‘0’ when either of the two inputs is a binary ‘1’.

The gates described so far are quite simple in structure. They have one or two inputs and one output. They are the fundamental elements in creating more complex chips, and even the basis of complete computer CPUs. In the case of the simple two-input AND gate, there are four discrete combinations of inputs. The two inputs are represented by a two-digit binary number. Remember last month? They are 00, 01, 10 and 11, and the output for each given condition is 0, 0, 0 and 1, respectively. Not so hard to remember or display. But, in other chips, where there might be five or six inputs and eight or 10 outputs, it can be too much to remember. Now is when the “truth table comes in. The definition of a truth table is: “A truth table is a graphic representation of all possible combinations of inputs versus outputs of a particular logic element.”

The second column of Figure 1 represents the truth tables for the given gates. Notice that all possible combinations of inputs are given. Columns A and B are the inputs, as you can see from the gates in Column 1. Column Y is the output. Read the truth table as you read text, one line at a time. Each line is one condition. The condition is given for ‘A’ and ‘B’. The output, ‘Y’, is the result for a given gate. Every line is different, and continues until all possible combinations for that gate are shown. This way, at a glance, you can tell what the output is for a given input of any gate. In these cases, it is not too difficult to follow or remember. Later on, when I show you the truth tables for some of the chips that make up our good ol’ CoCo, you will be glad I introduced you to these tables.

Though I will not be getting into great detail in this series of articles, I feel it is necessary to talk a little about Boolean algebra. The definition of Boolean algebra is: “A system of mathematical logic used to represent digital logic signals and express the logic operations performed by digital signals.”

To put it into simple terms, Boolean algebra is an equation that represents the function of a logical element. Take, for instance, the buffer in Figure 1. The output is equal to the input. A Boolean equation would be:

Y = A

Now an inverter would look like this:

Y = NOT A or Y = *A

The AND symbol in a Boolean expression is a dot in the middle of the line, like the multiplication sign in regular math. Notice its occurrences in Figure 1. The OR symbol in a Boolean expression is a plus sign (+). Again, the Boolean OR symbol can be seen in Figure 1. The next Boolean symbol is the EXCLUSIVE-OR. This is no more than the plus symbol with a circle around it. Figure 1 also shows the XOR symbol. Any of the inverting symbols in Boolean algebra are represented by a small horizontal bar above the equation in question. You can see the inverting gates in Figure 1.

That is it for this month. If you are going to the Palo Alto RAINBOWfest, Feb. 14-16, come and see me at the DISTO booth.

References

1) *Contemporary Electronics*, McGraw-Hill Continuing Education Center.

2) *Digital Computer Logic and Electronics*, The Algorithms Press.

3) *Model 100 Service Manual*, Radio Shack, Tandy Corporation.

4) *The TTL Data Book*, Texas Instruments, Incorporated.

5) *Microcomputer Interfacing*, Prentice-Hall, Inc.

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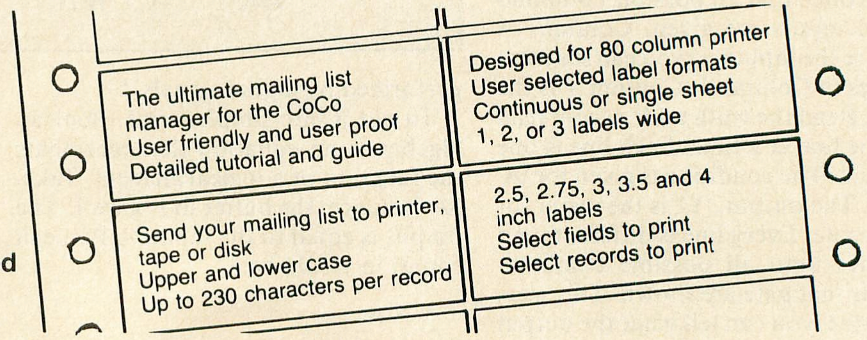

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Enhancing the CLS Command

This machine language subroutine completely replaces the CLS command and adds several options to its standard features

By Gerry Schechter

With the possible exception of `PRINT`, the `CLS` command is probably the most often-used command when it comes to writing text-based BASIC programs. The `CLS` command has nine variations that correspond to the available colors in the text mode. I concluded these nine variations were not enough and decided to do something about it.

SuperCLS is a machine language subroutine that enhances the `CLS` command. Aside from the standard options accessible with the normal `CLS` command, several other options are also available. These include clearing the screen to any character that can be displayed, clearing only a portion of the screen and inversing the video of the characters on the screen.

The short demonstration program accompanying this article should serve to illustrate most of these features. However, some additional explanation is in order. The machine language subroutine is completely relocatable, so it can be placed anywhere in memory that won't be clobbered by BASIC. The subroutine uses BASIC's current cursor position in order to determine the starting point for the *SuperCLS* operation. This is controlled from your BASIC program by using the `PRINT` and `PRINT@` statements. Therefore, the subroutine starts its operation from wherever BASIC normally prints its next character.

Control is passed to the subroutine via a `USR` call. The value in the parentheses is the value that is used for the *SuperCLS* operation. This can be any value ranging from zero to 255. These are the same values you normally use in a `PRINT CHR$` statement. The only exception to this is the value of 32, which inverses the video on the screen instead of clearing it.

If it is still unclear as to how the subroutine works, take a few minutes to type in and run the demonstration program. As someone once said, "A picture is worth a thousand words." Have fun, and feel free to use this subroutine in your next program.

(Any questions you have regarding *SuperCLS* may be directed to the author at 75 Midland Terrace, Yonkers, NY 10704, phone 914-965-8102. Please include an SASE when writing.) ☐

(Gerry Schechter has over 13 years of data processing experience. He is currently employed at Mercy College, where he is the manager of systems and programming. His hobbies include programming his CoCo and IBM PC. Gerry lives in Yonkers, New York.)

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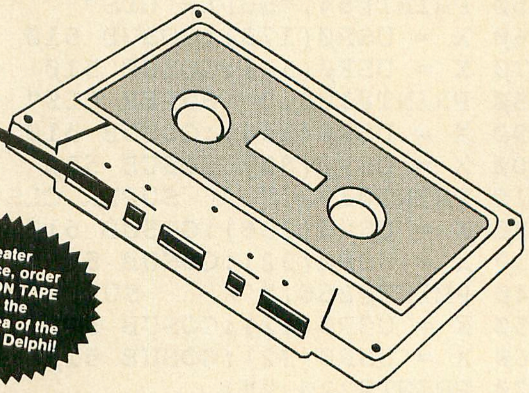

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310 204
570 152
END 1000

The listing: SUPERCLS

```
1 '=>SUPERCLS V1.0<=
2 ' GERRY SCHECHTER
3 '75 MIDLAND TERRACE
4 'YONKERS, NY 10704
5 '  FEBRUARY 1984
6 '"'"'"'"'"'"'"'"'"'
100 CLS
110 PRINT"    **  S U P E R  C L
 S  **"
120 GOTO 420
130 X = USR0(169):GOSUB 510
140 X = USR0(32):GOSUB 510
150 PRINT@64,"SUPER CLS"
160 X = USR0(179):GOSUB 510
170 X = USR0(32):GOSUB 510
180 PRINT@128,"  SUPER CLS"
190 X = USR0(154):GOSUB 510
200 X = USR0(32):GOSUB 510
210 PRINT@192,"    SUPER CLS"
220 X = USR0(236):GOSUB 510
230 X = USR0(32):GOSUB 510
240 PRINT@256,"      SUPER CLS"
250 X = USR0(42):GOSUB 510
260 X = USR0(32):GOSUB 510
270 PRINT@320,"";
280 FOR Z = 1 TO 255
290 X = USR0(Z)
300 SOUND Z,1
310 NEXT Z
320 PRINT@0,"";
330 X = USR0(32)
340 FOR Z = 32 TO 480 STEP 32
350 PRINT@Z,"";
360 X = USR0(32)
370 PLAY"T255L255O1V31;1V<1V<1"
380 GOSUB 520
390 NEXT Z
400 PRINT@448,"";:END
410 'PROTECT MEMORY AND
 DEFINE USER CALL
420 IF PEEK(116) = 127
 THEN CLEAR 200,32735
 ELSE CLEAR 200,16351
430 IF PEEK(116) = 127
 THEN ML = 32736
 ELSE ML = 16352
440 DEF USR0 = ML
450 'POKE ML PROGRAM INTO MEMORY
460 FOR X = ML TO ML+29
470 READ X$
480 POKE X,VAL("&H"+X$)
490 NEXT X
500 GOTO 130
510 SOUND 255,2
520 FOR X = 1 TO 500
530 NEXT X
540 RETURN
550 'DATA FOR ML SUBROUTINE
560 DATA BD,B3,ED
570 DATA 9E,88
580 DATA C1,20
590 DATA 26,0D
600 DATA A6,84
610 DATA 88,40
620 DATA A7,80
630 DATA 8C,05,FF
640 DATA 23,F5
650 DATA 20,07
660 DATA E7,80
670 DATA 8C,05,FF
680 DATA 23,F9
690 DATA 39
700 'SOURCE FOR ML SUBROUTINE
710 '       ORG  $7FE0
720 'CURSOR EQU  $88
730 'START  JSR  $B3ED
740 '       LDX  CURSOR
750 '       CMPB #32
760 '       BNE  LOOP2
770 'LOOP1  LDA  ,X
780 '       EORA #$40
790 '       STA  ,X+
800 '       CMPX #$5FF
810 '       BLS  LOOP1
820 '       BRA  RETURN
830 'LOOP2  STB  ,X+
840 '       CMPX #$5FF
850 '       BLS  LOOP2
860 'RETURN RTS
870 '       END  START
```

One-Liner Contest Winner . . .

This one-liner makes a warbling sound similar to a fire siren.

The listing:

```
1 PLAY"V31T255L1O4":FORX=1TO6500
0:PLAY"1;2;3;4;5;6;7;8;9;10;11;1
2;11;10;9;8;7;6;5;4;3;2;1":NEXTX
:REM SIREN
```

Darrell Behrmann
Napoleon, OH

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

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SOUND TUTORIAL **16K ECB**

Further Adventuring Into SOUND Experimentation

Producing sounds without the PLAY or SOUND commands

By Bill Bernico

(Editor's Note: This article is an addendum to "An Adventure Into Sound Experimentation," which appeared in the October 1985 RAINBOW, Page 124. For more complete information, please refer to this previous article.)

Half the fun of programming is trying to discover the unusual, the bizarre and the humorous. I think I've combined all three elements in *Sound Story 2*, a continuation of my original *Sound Story* program from the October 1985 RAINBOW. The significant difference with this installment is that it doesn't use any `SOUND` or `PLAY` commands. That's right, there's another way to generate sounds — one I stumbled on purely by accident. Remember, experimentation often leads to some of the best ideas.

In order to generate the odd sounds contained in this program I had to `POKE` values into memory. By trial and error, I found the combination of values that were right for each sound. I had some help finding these values, though, in the form of the second program listing, *Random Sound Generator*. With it, you can hear randomly created sounds *and* see the values that went into making up the sound. From there you can jot down the values and insert them into the proper slots in the main program.

If you'd like to make up your own sounds, be it for part of a program or a menu-driven sound selection such as SS2, first run *Random Sound Generator*. Immediately you'll hear an odd sound, followed by a listing like this:

```
Number of times   (N)= 2
Duration value    (D)= 88
Start address     (S)= 1327
Ending address    (E)= 2784
```

The number of times is fixed at '2', but the duration, start address and end address are random. The values for 'N' and 'D' can be from one to 255. The start and end addresses can be any value up to 65,536. Keep this in mind when you use values from here for your program. The difference between the 'S' and 'E' values is restricted to a maximum of 3,000 simply because it might randomly generate a start address of, for example, 123, and an end address of 65,000 with a duration of 255. You could wait a long time to hear that kind of sound played twice (the value of 'N').

The Main Program

I purposely stayed away from sounds you might hear in any run-of-the-mill program and instead created some unusual sounds from which to pick. When the menu page appears, simply press any number key from 1-9 to hear a

---

(Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wisconsin.)

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VISA **Federal Hill Software 8134 Scotts Level Rd. Baltimore, Md. 21208** MasterCard sound, or press 'E' to end the program. Each sound selection features a short description of what you're hearing.

The idea behind selection number '9' is just what it says. It's a randomly selected sound that can be named whatever you like. Unless you select number '9' 3,000 times, chances are you won't hear the same sound twice. Sometimes it's short and barely audible and sometimes it's 10 seconds long, so listen closely for it.

(Questions about these programs may be directed to the author at 708 Michigan Ave., Sheboygan, WI 53081, phone 414-459-7350. Please include an SASE when writing.) ☐

200 228
360 214
END 132

Listing 1: SOUND 2

```
10 'SOUND STORY 2 (THE SEQUEL)
20 'BY BILL BERNICO
30 '708 MICHIGAN AVE.
40 'SHEBOYGAN, WI 53081
50 '(414) 459-7350
60 '
70 DATA 16,190,63,0,190,63,3,166
,128,72,72,183,255,32,141,12,31,
16,179,63,5,38,240,49,63,38,233,
57,182,63,2,74,38,253,57
80 FOR I=16135 TO 16169
90 READ A
100 POKE I,A
110 NEXT I
120 DEFUSR0=16135
130 POKE 65281,(PEEK(65281) AND
247)
140 POKE 65283,(PEEK(65283) AND
247)
150 POKE 65315,(PEEK(65315) OR 8
)
160 CLS:PRINT@3,"SOUND STORY 2 (
THE SEQUEL)
170 PRINT@75,"selections:
180 N=0:D=0:S=0:E=0
190 PRINT@128,"1. 78 RPM RECORD
SCRATCHING
200 PRINT@160,"2. WILD AMINAL MA
TING CALL
210 PRINT@192,"3. SOMEONE DIALIN
G '555'
220 PRINT@224,"4. FRONT DOOR BUZ
ZER
230 PRINT@256,"5. WILLIE WONKA'S
 FACTORY
240 PRINT@288,"6. A PEG-LEG CENT
IPEDE
250 PRINT@320,"7. DEATH RAY SPAC
E GUN
260 PRINT@352,"8. NUCLEAR POWERE
D HUMMINGBIRD
270 PRINT@384,"9. (RANDOM) YOU N
AME IT
280 PRINT@448,"SELECT (1-9) OR e
ND
290 A$=INKEY$:IF A$=""THEN 290
300 IF A$="E"THEN CLS:END
310 M=VAL(A$):ON M GOTO 330,340,
350,360,370,380,390,400,410
320 GOTO 290
330 CLS:PRINT@132,"A 78 RPM PHON
OGRAPH NEEDLE       AT THE END OF
 THE RECORD.":N=6:D=33:S=56789:E
=60000:GOTO420
340 CLS:PRINT@132,"IT'S THE MATI
NG CALL OF          PURPLE-BELLIE
D, FRILLY-          CROWNED, 3-TO
OTH SNIPE.":N=6:D=143:S=44:E=999
:GOTO420
350 CLS:PRINT@130,"THIS IS WHAT
IT SOUNDS LIKE      FROM YOUR END
 WHEN YOU DIAL      '555'.":N=3:D
```

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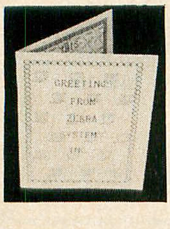

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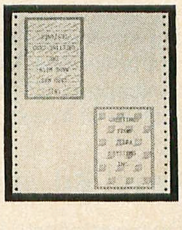

```
=190:S=888:E=2222:GOTO420
360 CLS:PRINT@132,"IT COULD ALSO
 BE THE BACK       DOOR BUZZER."
:N=255:D=2:S=11:E=111:GOTO420
370 CLS:PRINT@132,"YOU'RE INSIDE
 THE FACTORY       WHERE THEY MA
NUFACTURE THE      EVERLASTING G
OB STOPPERS!":N=10:D=33:S=333:E=
3333:GOTO420
380 CLS:PRINT@132,"   READY...MA
RCH.               LEFT,RIGHT,RI
GHT,RIGHT,         LEFT,RIGHT,RI
GHT,RIGHT,         LEFT,RIGHT,RI
GHT,RIGHT...":N=8:D=108:S=809:E=
2334:GOTO420
390 CLS:PRINT@132,"YOU JUST GOT
ZAPPED BY          COMMANDER COM
MOTION OF          THE 33RD STAR
 FLEET!":N=35:D=44:S=66:E=444:GO
TO420
400 CLS:PRINT@132,"IF THERE WAS
SUCH A THING,      THIS IS WHAT
IT WOULD SOUND     LIKE...OR WOU
LD IT?":N=77:D=7:S=77:E=777:GOTO
420
410 CLS:PRINT@132,"WHAT THE HECK
 WAS THAT?":N=2:D=RND(255):S=RND
(3000):E=RND(3000)+S
420 POKE 16128,INT(N/256):POKE 1
6129,N-INT(N/256)*256
430 POKE 16130,D
440 POKE 16131,INT(S/256):POKE 1
6132,S-INT(S/256)*256
450 POKE 16133,INT(E/256):POKE 1
6134,E-INT(E/256)*256
460 A=USR0(0)
470 GOTO 160
```

```
10 'RANDOM SOUND GENERATOR
20 'USED TO PRODUCE SOUNDS IN
   SOUND STORY 2 (THE SEQUEL)
30 '
40 DATA 16,190,63,0,190,63,3,166
,128,72,72,183,255,32,141,12,31,
16,179,63,5,38,240,49,63,38,233,
57,182,63,2,74,38,253,57
50 FOR I=16135 TO 16169
60 READ A
70 POKE I,A
80 NEXT I
90 DEFUSR0=16135
100 POKE 65281,(PEEK(65281) AND
247)
110 POKE 65283,(PEEK(65283) AND
247)
120 POKE 65315,(PEEK(65315) OR 8
)
130 CLS
140 N=2:D=RND(255):S=RND(3000):E
=RND(3000)+S
150 POKE 16128,INT(N/256):POKE 1
6129,N-INT(N/256)*256
160 POKE 16130,D
170 POKE 16131,INT(S/256):POKE 1
6132,S-INT(S/256)*256
180 POKE 16133,INT(E/256):POKE 1
6134,E-INT(E/256)*256
190 A=USR0(0)
200 PRINT@6,"random sound genera
tor"
210 PRINT:PRINT
220 PRINT"NUMBER OF TIMES (N)=";
N
230 PRINT"DURATION VALUE  (D)=";
D
240 PRINT"START ADDRESS   (S)=";
S
250 PRINT"ENDING ADDRESS  (E)=";
E
260 PRINT@484,"HIT ANY KEY TO DO
 ANOTHER";:EXEC44539
270 GOTO 130
```

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CORRECTIONS

"Around the World in 18 Frames" (August 1985, Page 73): Tino, Daniel and Bob Delbourgo wrote to tell us that some readers had problems saving the frames to tape. This can be fixed in Line 150 of the *Earthrot* listing by inserting a colon (:) between the commands `THEN` and `CSAVEM`. This problem has no effect when using the program with disk systems.

"KISSable OS-9" (December 1985, Page 272): Albert Pinto tells us that his `C` tip on Page 285 has two typographical errors. The location 133d should read 135d, and the "Old (two disks)" value in the right-hand column, which now reads as 59, should be E9 (left column reads 27aa).

"Downloads" (January 1986, Page 232): The listing on Page 233 lost portions of some lines due to a printer problem. Here is the corrected listing:

```
10 'DISK DIR LISTER-RAINBOW MAG
MAR 82 PG 31
20 'REWRITTEN BY DAN DOWNARD 2/8
3
30 CLEAR1500:DIM GR(68)
40 INPUT"PRINTER(Y/N)";P$:IFP$="
Y"THENP=-2
50 FT$(0)="LOAD":FT$(1)="DATA"
60 FT$(2)="LOADM":FT$(3)="EDIT"
70 AF$(0)="BIN":AF$(1)="ASC"
80 U1$="%      % % % %   % % % #
#"
90 U2$=" ## ###"
100 U3$="   %   %
   ## ###"
110 PRINT#P:INPUT"DISK NAME";D$:
INPUT"DATE";DA$:GT=0:ST=0
120 PRINT#P,"DISK NAME: "D$:IFDA
$<>""THEN PRINT#P,"AS OF DATE:"D
A$
130 IFP=-2 THENPRINT#-2
140 PRINT#P,"NAME      EXT TYPE
FMT G1 #G  #S START,END  ,EXEC"
150 DSKI$ 0,17,2,A$,B$:FB$=LEFT$
(A$,68)
160 FORI=1TO68:GR(I-1)=ASC(MID$(
FB$,I,1)):NEXTI
170 FORX=3TO11
180 DSKI$ 0,17,X,AA$,BB$
190 AA$=AA$+LEFT$(BB$,120)
200 FORN=0TO7
210 NA$=MID$(AA$,N*32+1,8):EX$=M
ID$(AA$,N*32+9,3):GR=ASC(MID$(AA
$,N*32+14,1))
220 FG=GR
230 FT$=MID$(AA$,N*32+12,1):AF$=
MID$(AA$,N*32+13,1)
240 IF LEFT$(NA$,1)=CHR$(0) THEN
380
250 IF LEFT$(NA$,1)=CHR$(255)THE
N390
260 AF=ASC(AF$)AND1
270 FORI=1TO68
280 IF GR(GR)<128THEN GR=GR(GR):
NEXTI
290 IF ASC(FT$)=2 THEN420
300 PRINT#P,USINGU1$;NA$;EX$;FT$
(ASC(FT$));AF$(AF);FG;
310 GN=1:SN=0
320 GV=ASC(MID$(FB$,FG+1,1)):IF(
GV AND&HC0)=&HC0 THEN340
330 GN=GN+1:SN=SN+9:FG=GV:GOTO32
0
340 SN=SN+(GV AND&H3F):PRINT#P,U
SINGU2$;GN;SN;
350 GT=GT+GN:ST=ST+SN
360 IF ASC(FT$)=2 THEN PRINT#P,T
AB(34)"$";BP$;",$";EP$;",$";EA$;
370 PRINT#P
380 NEXT N,X
390 PRINT#P,USINGU3$;"TOTAL";GT;
ST
400 PRINT#P,USINGU3$;"FREE";68-G
T
410 GOTO 110
420 LG=GR(GR):LS=LG AND 31:LL=GR
430 LB=ASC(MID$(AA$,N*32+16,1))
440 IF FG<34 THEN TN=INT(FG/2) E
LSE TN=INT(FG/2)+1
450 SN=1+(FG AND 1)*9
460 DSKI$0,TN,SN,A$,B$
470 BP=ASC(MID$(A$,4,1))*256+ASC
(MID$(A$,5,1))
480 BP$=HEX$(BP):BP$=STRING$(4-L
EN(BP$),"0")+BP$
490 EP=BP+ASC(MID$(A$,2,1))*256+
ASC(MID$(A$,3,1))-1
500 EP$=HEX$(EP):EP$=STRING$(4-L
EN(EP$),"0")+EP$
510 IF LL<34 THEN TN=INT(LL/2) E
LSE TN=INT(LL/2)+1
520 SN=(LL AND 1)*9+LS
530 DSKI$0,TN,SN,A$,B$:A$=A$+LEF
T$(B$,127)
540 EA=ASC(MID$(A$,LB-1,1))*256+
ASC(MID$(A$,LB,1))
550 EA$=HEX$(EA):EA$=STRING$(4-L
EN(EA$),"0")+EA$
560 GOTO 300
```

Also, in the answer to the first letter on Page 232 ("CoCo Goes to Spain"), the statement "a 14.31818 crystal" should read "a 14.31818 MHz crystal."

In our effort to advise you quickly of any revisions, omissions, corrections or enhancements to our program listings, these will be posted on our new Delphi CoCo SIG as soon as they are reported, and will then be printed in the earliest possible issue of THE RAINBOW. From the CoCo SIG> prompt, pick TOPICS, then INFO ON RAINBOW.

32K
Disk

Now you can use CoCo's assistance for compiling program documentation

Cross-Reference Your Programs with XREF

By Douglas Van Dusen

Have you ever had to go back to a program you wrote several months ago and couldn't find your way around the program? Well, you have fallen to the bane of all programmers: documentation! The worst part of writing a program is documenting it. *XREF* helps make it easier to do that documentation by making the CoCo do most of the work for you.

XREF will list your program and cross-reference it. It is easy to modify *XREF* since the line length and number of references per line have been placed in variables. This program also works for tape users as the device number has been placed in a variable, also.

Some of the rules for using this program are: 1) The program must be saved in ASCII; 2) In present form a `PCLEAR 0` must be done for disk operation (see "Program Modifications" for more on this); 3) You must have a printer (any width will do); 4) Don't use the high speed `POKE`s in the program with a software spooler program. It will mess up the printout; and 5) Be sure you have no machine language programs in memory — you need all the memory you can get.

Let's have a look at the program section by section:

Line	Description
1	Sets the printer Baud rate (9600 in my case).
2 - 3	Displays the status and statistics while the program operates (so you can tell it's doing something).
4 - 8	Sets up the parameters, finds out what options you have selected and enters the program line.
9 - 40	Breaks (parse) the input lines and finds the reserved words using the data in the RW$ array. These come from the `DATA` statements.
41 - 58	Prints the cross-reference portion of the listing.
59 - 71	This is the page break portion of the program. It works no matter how wide the listing is to be created.
72 - 73	Clears the string space and dimensions the arrays that are necessary for program operation. This is where you can customize the program to suit your system (see "Program Modifications").
74 - 75	Displays the credits for the program (I request that these lines remain unchanged).
76 - 80	Reads the `DATA` statements and places the reserved words in the RW$ array.
81 - 86	Takes the programs to be "XREFed" (10 MAX). The program may or may not have the extension, however,

---

(Douglas Van Dusen is the chief of computer operations for Holloman AFB in New Mexico. He has worked in data processing for over 10 years and served in the U.S. Air Force for 18 years.)

Files
View
Disk
?
Data Directory
File1
Datafile
Budget
April85
Friends
Bulletin
Kidstuff
Resumes
Year1985
Compusrv
DowJones
Picture1
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Recipes
Entrpriz
1
2
3

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ludes an easy-to-use menu and au-
omatic column formatting. You can
ise *LEDGER* to do budgeting,
ales forecasting, profit-and-loss
rojections and other "What
f . . .?" calculations.

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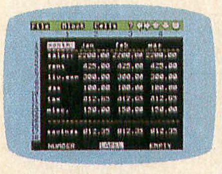
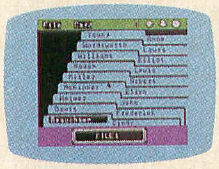

LEDGER

The *INDEX CARDS* personal filing system lets you enter and edit data and perform simple sorts and searches. It's ideal for keeping track of names and addresses.


INDEX CARDS

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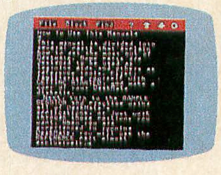
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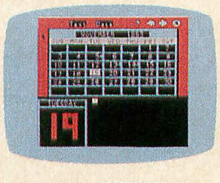
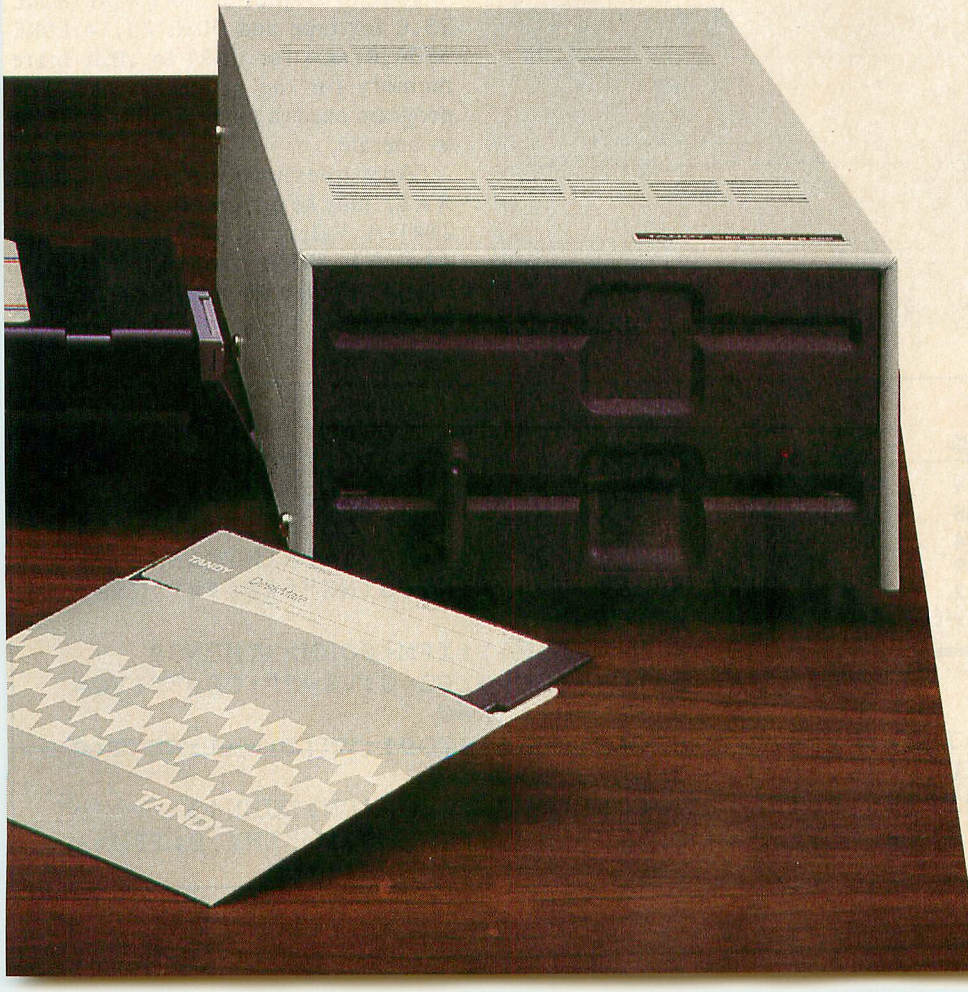

CALENDAR



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XREF Sample Run

```
                                                                  PAGE   1
"XREF"   -  February 26, 1986

SYMBOL                REFERENCE LINE
-----------------------------------------------------------------------------
     2                  10
     4                  90
-----------------------------------------------------------------------------
     7                   8      12      16      17      26      27
    12                  15      16      18      21      26      29      41
                        42
    22                  14
-----------------------------------------------------------------------------
    23                  24
    30                  12      16      17      20      25
    33                  33
-----------------------------------------------------------------------------
    35                  33
    37                  34
    38                  31      34
-----------------------------------------------------------------------------
    39                  18      19
    41                  14
    42                  23
-----------------------------------------------------------------------------
    43                   7
    46                  57
    50                  55
-----------------------------------------------------------------------------
    58                  46
    62                  44      47      54
    63                  47      48
-----------------------------------------------------------------------------
    64                   8
    66                  66
    67                  67
-----------------------------------------------------------------------------
    68                   6      62      65
    69                  68
    72                   1
-----------------------------------------------------------------------------
    76                  78
    79                  76
    82                  86
-----------------------------------------------------------------------------
    85                  84
    87                  83
    88                   4      88
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
BC                       2       5       9      60
BN                       9      22      28      41
BR                      15
-----------------------------------------------------------------------------
C                       22      23      31      32
```

	if the extension is not BAS you must enter the extension (disk users don't use the drive number).
87	Used to input the date (it may also be used to put some comment of no more than 50 characters).
88	Enters the selection of what you want the program to do.
89 - 93	The loop that runs all of your programs you want to cross-reference.
94 - 96	The `DATA` statements that have the reserved words.

Program Modifications

Line 1: This may be changed to reflect the Baud rate used for your printer.

Line 72: The arrays RF and NX may be enlarged (for tape system or 40K BASIC program use). These arrays must be the same size. The HI and LO variables are used for the high speed `POKE`; these may be deleted if your machine won't handle it. Be sure to remove all `POKE HI` and `POKE LO` references in the rest of the program.

Line 73: The DN variable is set to '1'. If it is set to -1 you will enter from tape. LW is the line width. Set it as you wish for your printer. ZR is the number of references per line. Use 6 for 80 cpl, 7 for 96 cpl and 11 for 132 cpl.

You can use the `PCLEAR 0 POKE` (`POKE 25,6` for tape and `POKE 25,14:POKE 3584,0:NEW` for disk) to clear more memory for the program's use. The program needs a minimum of 500 bytes to operate.

(Any questions you have about *XREF* may be directed to the author at 2541-A Valencia Drive, Holloman AFB, NM 88330, phone 505-479-4035. Please enclose an SASE for a reply when writing.) ☐

14 53
35 121
54 87
69 37
82 207
END 103

The listing: `XREF`

```
1 POKE150,1:GOTO72
2 PRINT@0,STRING$(46,128);"xref"
;STRING$(46,128);:PRINT@129,"PRO
GRAM-ID: ";F$(F):PRINT@196,"LINE
 NO: ";:PRINTUSING"######";LN:PR
INT@257,"LINE COUNT: ";:PRINTUSI
NG"######";LC-1:PRINT@321,"BYTE
COUNT: ";:PRINTUSING"######";BC
3 PRINT@386,"REF COUNT: ";:PRINT
USING"######";RC+1:PRINT@453,"ME
MORY: ";:PRINTUSING"######";MEM:
RETURN
4 M=VAL(M$):IFM<0ORM>3THEN88
5 LC=0:BC=0:PZ=0:V$="":C$="":VC=
91:RC=-1:SZ=0
6 CLS:FORI=0TO91:VN(I)=-1:NEXT:G
OSUB68
7 POKELO,0:IFEOF(DN)THEN43
8 LINEINPUT#DN,L$:POKEHI,0:IFM>1
```

```
GOSUB64:IFM=2THEN7
9 LG=LEN(L$):BN=0:ER$="":LC=LC+1
:BC=BC+LG
10 LP=INSTR(L$," "):LN=VAL(LEFT$
(L$,LP)):GOSUB2
11 IFLN>32767THENLN=LN-65536
12 LP=LP+1:IFLP>LG GOSUB30:GOTO7
13 C$=MID$(L$,LP,1)
14 IFC$>="A"ANDC$<="Z"THEN22ELSE
IFC$>="0"ANDC$<="9"THEN41
15 IFC$=" "THEN12ELSEIFC$<>","TH
ENBR=0
16 IFC$=CHR$(34)GOSUB30:LP=INSTR
(LP+1,L$,C$):IFLP>0THEN12ELSE7
17 IFC$="'"GOSUB30:GOTO7
18 IFC$="$"GOSUB39:GOTO12
19 IFC$="("GOSUB39
20 GOSUB30:IFC$<>","THENER$=""
21 GOTO12
22 C=ASC(C$):P=PT(C-65):BN=0
23 IFC<ASC(RW$(P))THEN42
24 IFINSTR(LP,L$,RW$(P))<>LP THE
NP=P+1:GOTO23
25 GOSUB30:RW$=RW$(P)
26 IFRW$="DATA"THENLP=INSTR(LP,L
$,":"):IFLP>0THEN12ELSE7
27 IFRW$="REM"THEN7
28 IFRW$="GOTO"ORRW$="THEN"ORRW$
="ELSE"ORRW$="GOSUB"THENBN=1
29 LP=LP+LEN(RW$)-1:GOTO12
30 IFV$=""THENRETURN
31 IFV$>="A"THENV$=V$+ER$:C=ASC(
V$)+1ELSEIFV$>="0"THENV$=RIGHT$(
"     "+V$,5):C=VAL(LEFT$(V$,2))E
LSE38
32 IL=-1:I=C
33 IFV$>V$(I)THENIL=I:I=VN(I):IF
I>0THEN33ELSE35
34 IFV$=V$(I)THENJ=LS(I-91):IFRF
(J)=LN THEN38ELSERC=RC+1:NX(J)=R
C:GOTO37
35 VC=VC+1:IFIL>=0THENVN(IL)=VC
36 V$(VC)=V$:VN(VC)=I:RC=RC+1:FR
(VC-91)=RC:I=VC
37 RF(RC)=LN:NX(RC)=-1:LS(I-91)=
RC
38 V$="":RETURN
39 IFV$<>""THENV$=V$+C$
40 RETURN
41 IFV$=""ANDBN=0THEN12
42 V$=V$+C$:GOTO12
43 IFM=2THENRETURN
44 PZ=0:GOSUB62
45 FORJ=0TO91:V=J
```

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```
46 V=VN(V):IFV<0THEN58
47 IFLZ>54GOSUB62ELSESZ=SZ+1:IFS
Z=3GOSUB63
48 IFLEFT$(V$(V),1)<>" "ANDQQ=0A
NDRZ<>3THENQQ=1:GOSUB63
49 RZ=0:I=FR(V-91):POKELO,0:PRIN
T#-2,V$(V);:POKEHI,0
50 IFRZ=0THENPOKELO,0:PRINT#-2,T
AB(16);:POKEHI,0
51 LN=RF(I):IFLN<0THENLN=LN+6553
6
52 POKELO,0:PRINT#-2,USING"     #
####";LN,:POKEHI,0
53 RZ=RZ+1
54 IFRZ>ZR THENRZ=0:POKELO,0:PRI
NT#-2:POKEHI,0:LZ=LZ+1:IFLZ>74GO
SUB62
55 I=NX(I):IFI>0THEN50
56 IFRZ>0THENPOKELO,0:PRINT#-2:P
OKEHI,0:LZ=LZ+1
57 GOTO46
58 NEXTJ
59 POKELO,0:PRINT#-2,STRING$(LW,
"=")
60 PRINT#-2,"LINE: ";LC-1;"
BYTE:";BC;"      SYMBOLS:";VC-91;
"     REFERENCES:";RC+1
61 LZ=LZ+3:POKEHI,0:RETURN
62 GOSUB68:POKELO,0:PRINT#-2,"SY
MBOL";TAB(20)"REFERENCE LINE":LZ
=LZ+1
63 POKELO,0:PRINT#-2,STRING$(LW,
"-"):LZ=LZ+1:SZ=0:POKEHI,0:RETUR
N
64 X=1
65 IFLZ>56ORRIGHT$(L$,3)=",PG"GO
SUB68
66 Y=INSTR(X,L$,CHR$(10)):IFY>0T
HENPOKELO,0:PRINT#-2,MID$(L$,X,Y
-X):LZ=LZ+1:POKEHI,0:X=Y+1:GOTO6
6
67 POKELO,0:PRINT#-2,MID$(L$,X,L
W):LZ=LZ+1:POKEHI,0:X=X+LW:IFX<L
EN(L$)THEN67ELSERETURN
68 POKELO,0:IFZZ=0THENZZ=1:GOTO6
9ELSEPRINT#-2,CHR$(12)
69 PZ=PZ+1:PRINT#-2:PRINT#-2,TAB
(LW-8)"PAGE ";:PRINT#-2,USING"##
#";PZ
70 PRINT#-2,PR$:PRINT#-2
71 LZ=4:POKEHI,0:RETURN
72 CLEAR1500:I=400:DIMVN(490),V$
(490),FR(400),LS(400),RF(1300),N
X(1300),RW$(120),PT(25):HI=65495
:LO=65494
73 DN=1:LW=80:ZR=6:CLS:PRINTSTRI
NG$(32,166);
```

```
74 PRINT"  XREF COLOR BASIC VERS
ION 1.0":PRINTSTRING$(32,166);:P
RINT"   (C)1984 WESTERN HORIZON"
:PRINTTAB(11)"SOFTWARE LTD.":PRI
NTSTRING$(32,166);
75 PRINT"LISTS ALL VARIBLES & RE
F LINE #":PRINTSTRING$(32,166);:
POKEHI,0:RW=0
76 READRW$:RW=RW+1:RW$(RW)=RW$:I
FRW$="\"THEN79
77 I=ASC(RW$)-ASC("A"):IFPT(I)=0
THENPT(I)=RW
78 GOTO76
79 FORI=0TO25:IFPT(I)=0THENPT(I)
=RW
80 NEXT:POKELO,0
81 FX=0
82 PRINT"PROGRAM-ID"FX+1":";:LIN
EINPUTL$
83 IFL$=""THENIFFX<1THENENDELSE8
7
84 IF(DN=-1)THEN85ELSEIFINSTR(L$
,"/")=0THENL$=L$+"/BAS"
85 FX=FX+1:F$(FX)=L$
86 GOTO82
87 PRINT:POKE282,0:LINEINPUT"DAT
E = ";D$:POKE282,255:PRINT:PRINT
"1) XREF 2) LIST 3)BOTH "
88 M$=INKEY$:IFM$=""THEN88
89 FORF=1TOFX
90 POKELO,0:CLOSE:OPEN"I",#DN,F$
(F):PR$=CHR$(34)+""+F$(F)+CHR$(3
4)+"  -  "+D$:POKEHI,0:GOSUB4
91 NEXTF
92 POKELO,0:PRINT#-2,CHR$(12)
93 END
94 DATAABS,AND,ASC,AS,ATN,AUDIO,
CIRCLE,CLS,CHR$,CLEAR,CLOSE,COLO
R,COS,CSAVE,CSAVEM,CLOAD,CLOADM,
CVN,DATA,DEF,FN,DLOAD,USR,DEL,DI
M,DSKI$,DSKO$,DRAW,ELSE,END,EOF,
EXP,EXEC,FREE,FIELD,FILES,FIX,FO
R,GET,GOSUB
95 DATAGOTO,HEX$,IF,INKEY$,INPUT
,INSTR,INT,JOYSTK,KILL,LEFT$,LEN
,LINE,LOAD,LOADM,LOC,LOF,LOG,LSE
T,MID$,MKN$,MEM,RENAME,NEW,NEXT,
NOT,ON,OPEN,OR,MOTOR,OFF,PEEK,PO
INT,PPOINT,POKE,POS,PUT,PRESET,P
SET,PAINT,PCLS,PCLEAR,PCOPY,PLAY
,PMODE,PRINT
96 DATAREAD,REM,RESET,RESTORE,RE
TURN,RIGHT$,RND,RSET,RUN,SAVE,SA
VEM,SGN,SIN,SQR,STEP,STOP,STR$,S
TRING$,SCREEN,SKIPF,SOUND,STOP,T
AB,TAN,THEN,TIMER,TO,UNLOAD,USIN
G,VAL,VARPTR,WRITE,VERIFY,"\"
```

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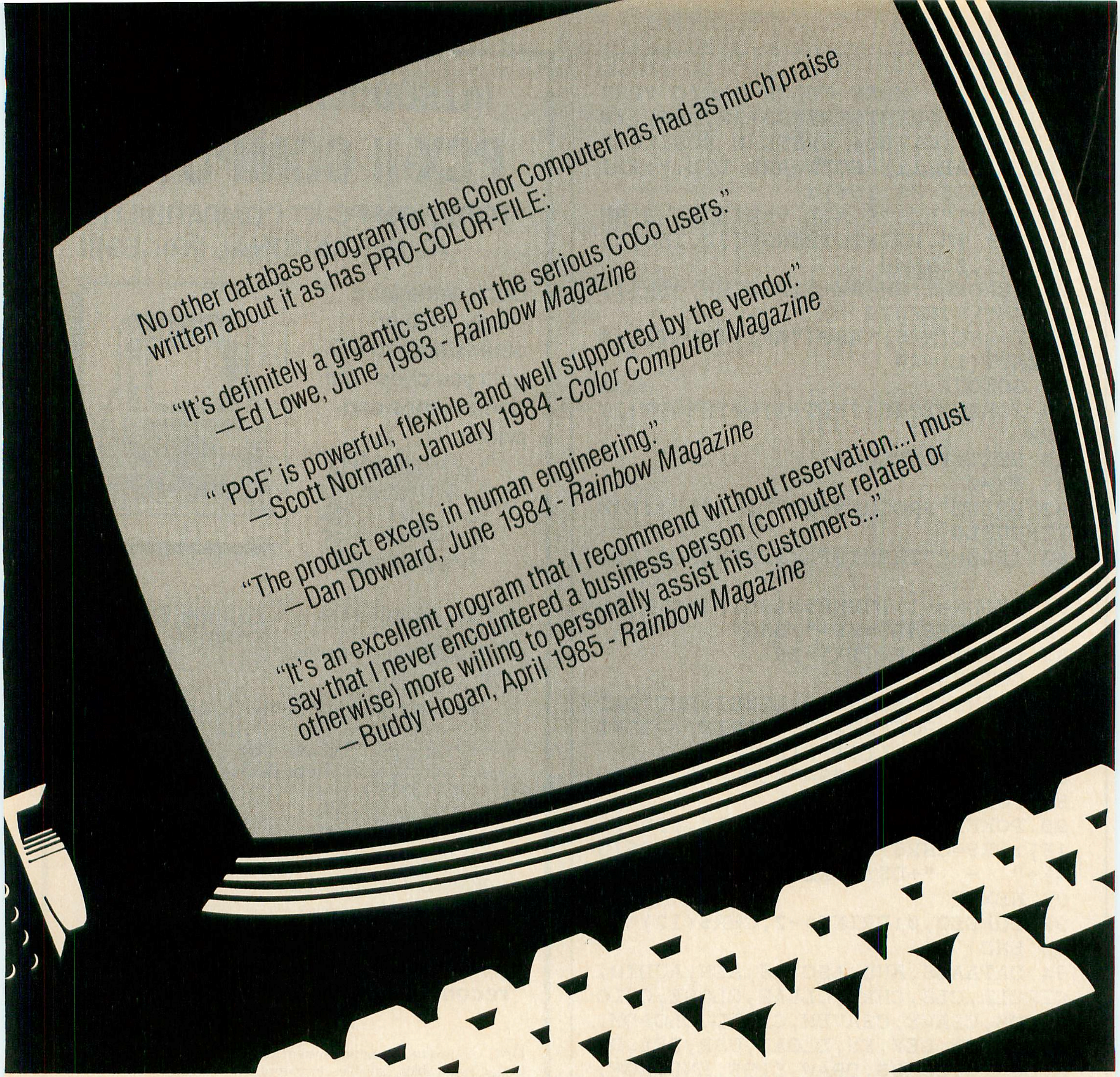

No other database program for the Color Computer has had as much praise written about it as has PRO-COLOR-FILE:

"It's definitely a gigantic step for the serious CoCo users."
—Ed Lowe, June 1983 - *Rainbow Magazine*

" 'PCF' is powerful, flexible and well supported by the vendor."
—Scott Norman, January 1984 - *Color Computer Magazine*

"The product excels in human engineering."
—Dan Downard, June 1984 - *Rainbow Magazine*

"It's an excellent program that I recommend without reservation...I must say that I never encountered a business person (computer related or otherwise) more willing to personally assist his customers..."
—Buddy Hogan, April 1985 - *Rainbow Magazine*

PRO-COLOR-FILE

ENHANCED 2.0

c 1984 by Derringer Software, Inc.

$59.95

The first serious database program available for the Color Disk System and, since its introduction in November 1982, it has remained the popular choice of the Color Computer user.

- 60 Data Fields for each record
- 1020 spaces available per record if needed
- Maximizes multiple drive operation
- 28 equation lines (+ − * /)
- IF-THEN-ELSE logic tests in equations
- Full Screen editing on up to 4 data entry screens
- Key click and auto key repeat
- Stores custom designed report formats
- Obtain totals, averages, or summaries for any field
- Output reports to printer, screen, or disk file
- Send data out to a DYNACALC compatible file
- Separate label generator for up to 10 across labels.
- Pre-define up to 16 indexes for searching/reporting file
- Sorts 750 records in under 5 minutes
- User defined selection menus
- Repeated tasks performed with one keystroke
- Comes with 75 pages of documentation in a 3 ring binder
- Supported by a national users group
- Full time programmer support
- Supplied on an unprotected disk

PRO-COLOR-FORMS 2.0

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PRO-COLOR-FORMS will access data files created with PRO-COLOR-FILE and merge them with a letter or place them on pre-printed forms.

• STORE UP TO 6 FORMATS • USER DEFINED PAGE SIZE • SUPPORTS SPECIAL PRINTER CONTROL CODES • RIGHT JUSTIFICATION • PASSWORD PROTECTION • MERGES WITH GRAPHICS FROM MASTER DESIGN OR TELEGRAPHICS •

You can use the built in ML text editor for creating the form or use your favorite word processor.

PRO-COLOR-DIR

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PRO-COLOR-DIR will read your directories and create a master data file that can be accessed by PRO-COLOR-FILE for sorting and reporting. 1000 + records can be stored on one diskette with valuable information about each program.

• DISK ID NAME • FILENAME/EXT • TYPE OF FILE • DATE CREATED • DATE UPDATED • NUMBER OF GRANS ALLOCATED • NUMBER OF SECTORS ALLOCATED AND USED • MACHINE LANGUAGE ADDRESSES •

You can obtain hard copies of the information and create labels of the filenames for placing on the diskette itself.

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WORD PROCESSOR POWER

\$54^{95}

CoCo Max II

GRAPHICS SUPERIOR

\$79^{95}

MASTER DESIGN

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This graphics program does more for you than just hi-res graphic editing. It will generate lettering in hi-res graphics that can be different sizes, skinny, bold, textured, drop shadowed, raise shadowed or tall. It will also interface with the Telewriter-64 word processor for printing hi-res displays with your letters.

As a graphics editor, it takes full advantage of all the extended BASIC hi-res graphic commands. Create boxes, circles, lines, copy displays and utilize GET and PUT features. Some added commands include mirror reflection, turn displays backwards or upside down. Squish displays, create dot patterns for shading or diagonal lines for creative backgrounds.

Special text files created with the Letter Head Utility allow you to access hi-res graphics from Telewriter-64, your own BASIC programs or PRO-COLOR-FORMS.

Interfaces with all popular dot matrix printers that have dot addressable graphic ability.

See reviews in:
July '84 Rainbow, Oct. '84 Hot CoCo **\$29^{95}**

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A Utility program for owners of DYNACALC®

DYNAGRAPH will transfer graphic files from DYNACALC to standard graphic files for further enhancing and labeling by graphic editing programs such as MASTER DESIGN, CoCo Max or Graphicom.

DYNAGRAPH can also reduce a graph vertically and horizontally so that multiple displays can be combined into one.

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(included FREE with DYNACALC®)

SIDEWISE

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SIDE WISE makes your printer do something you never thought possible—print side ways! Print out an ASCII stored spread sheet file that has up to 255 characters per row for easier viewing. No more hassles with trying to hold sheets together!

SIDE WISE will read in any ASCII text file and print it out side ways using a Radio Shack, Epson, Okidata, C-Itoh or Gemini printers having dot-graphics ability. SIDE WISE reads any ASCII file including BASIC programs and word processor files.

Add a new "twist" to your printer's capabilities!

(Disk Only) **\$24^{95}**

SIMON

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SIMON will "watch" you run through any BASIC program and keep track of every keystroke you make. The keystrokes can be saved in a disk file so the next time you want to perform the same procedure, SIMON will do it for you.

A custom menu can be created so that the press of one key will have SIMON run your BASIC program(s) and select the appropriate command file to use. You can even have SIMON pause at any input so that you can enter information that won't be the same each time.

SIMON is perfect for any type of reporting, file maintenance or any other program that requires a sequence of prompts to be answered each time it's used. Included free with PRO-COLOR-FILE.

Requirements: 64K Color Computer with Disk.

(Disk Only) **\$19^{95}**

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PRINT HI-RES GRAPHICS WHILE USING TELEWRITER-64!

Use your CoCo Max, Graphicom or any other graphics editing program to create your own letter heads or sales charts and then print them while you're using Telewriter-64. It's the perfect way to add that personal touch to your correspondence.

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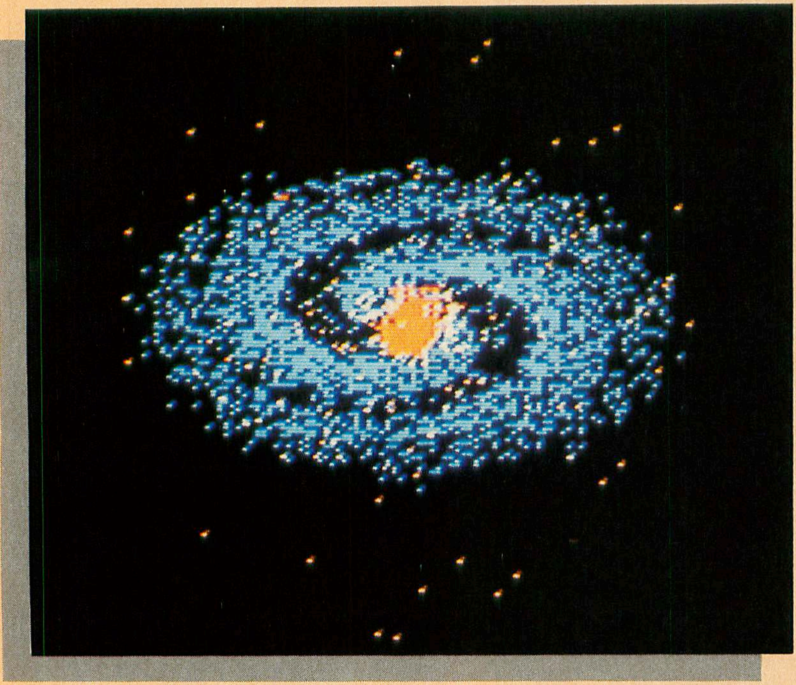
The CoCo Gallery

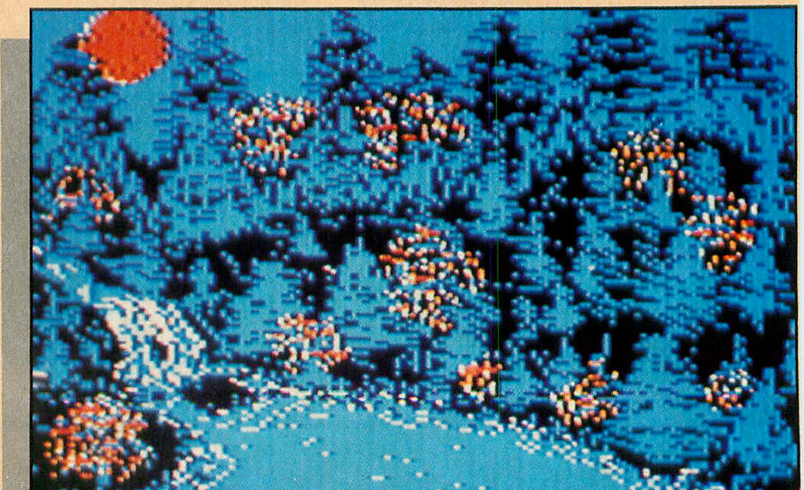


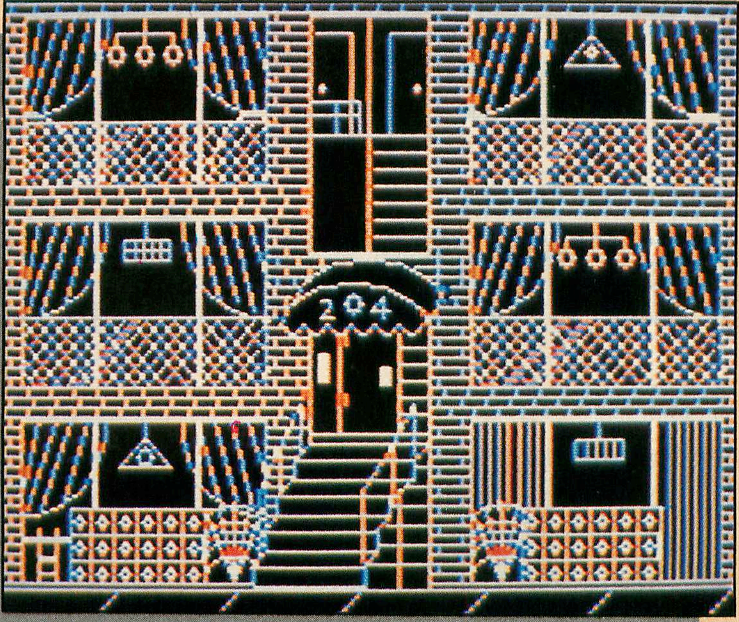
1st PRIZE

Larry Robinson
Galaxy
Larry opens this eclectic edition of "CoCo Gallery" with a vista of part of the Milky Way drawn using BASIC. Larry lives in Bloomington, Indiana.

2nd PRIZE

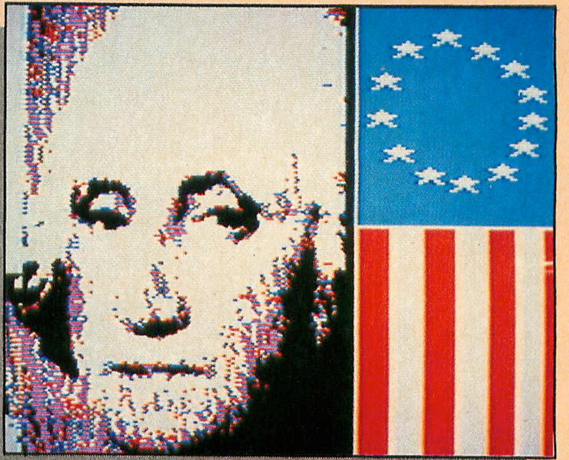
Tom Ives
Pond Scene
Tom used the X-Pad and a BASIC program he wrote to depict this pastoral setting. Tom lives in Culp Creek, Oregon.





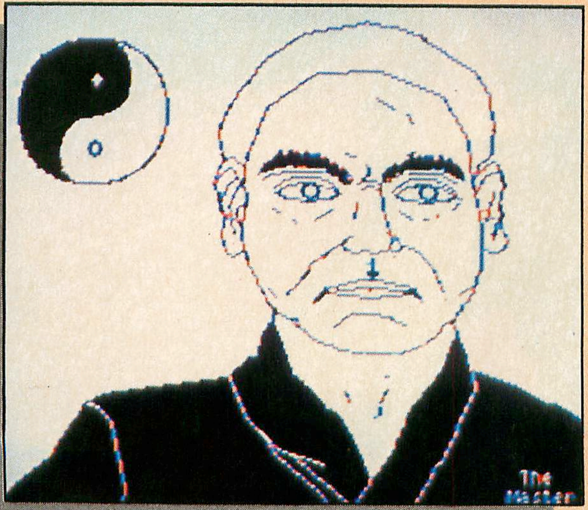
3rd PRIZE

Clifford M. Reuter, Jr.
Park Terrace
From Vienna, Virginia, Clifford sent this view of the facade of his condominium building drawn using BASIC.



HONORABLE MENTION

Robert C. Montowski
George W.
Robert used the DS-69 Digitizer and *CoCo Max* to portray the first president of the United States. Robert lives in Norristown, Pennsylvania.



HONORABLE MENTION

Darren Belanger
Ninja
Darren lives in Swan River, Manitoba, and used *Graphicom* to draw this portrait of a Ninja warrior meditating after battle.

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

— Monica Dorth, Curator

Send your entry on either tape or disk to:
CoCo Gallery
THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Monica Dorth

The Commandos

32K
ECB

Want You!

By Anthony Frerking

Welcome recruit, you have just been assigned to Camp Ike, training camp of the Commandos. The Commandos are an elite army force of skilled pilots and athletes. They are able to get in and out of any situation. You, in your infinite wisdom, have chosen to join them. There's only one problem: You must survive basic training. You must complete a three-stage test six times to achieve the beloved rank of Commando First Class. Each test increases in difficulty as one progresses up in levels.

Stage 1: Hundred-Yard Dash

A Commando must be fit, so to prove your agility you must run from the camp to the A.F.1 spider jet on the other side of the compound. Sounds easy, but look up; as you run bombs will drop. You are gone if the explosion or radioactivity reaches you. Upon reaching the jet it takes you to the next stage of the test.

Stage 2: Rescue

In this stage you control the jet in an attempt to rescue a helpless captive trapped in the valley. You must maneuver the jet down through the opening in the valley and avoid being shot. Once in the valley, you place the jet over the victim and press the firebutton to beam him up. Caution: On higher levels the tank moves toward the victim. If the tank runs over the victim, you both die. Once you have the victim, leave the valley and fly toward the left side of the screen to complete the second part of the test. Note: Hitting the valley walls will also kill you.

Stage 3: Obstacle Course

The final phase of each test is to successfully travel through the obstacle course. This requires starting at the top of Snake Rock, avoiding cannon fire and entering the cave at the bottom left of the screen to complete the test. As levels increase, moving walls are added to impede your progress. Should you get shot or crash into walls, you will die.

End of Game

The game is over when you have lost all of your men (there are three of them) or you finish six complete tests. At the end of the game you receive your score, your rank, the level last completed and number of lives you saved. If you complete all six levels, you are also given the total time to complete the tests and receive the Commando Medal of Honor. After seeing your statistics, the screen clears and displays the high scores (up to 10).

The first two levels are meant to give you a chance to get familiar with the game and how to handle the joystick.

You are awarded 100 points multiplied by the level you are on for each stage completed, plus extra points for finishing each stage under the required time limit. Good luck, Cadet!

(Anthony may be contacted with questions about *Commando* at 15505 E. 43rd. Street, Independence, MO 64055, phone 816-373-7409. Please enclose an SASE when writing.) ☐

(Anthony Frerking is a student at Central Missouri State University with a double major in business computers and commercial art. He works as a programmer for a small computer company, Artifacts Rarely Found.)

260	81	2320	102
430	222	3052	16
640	25	3220	224
1170	205	4090	151
1400	34	6070	108
1560	152	END	84
2120	102		

The listing: COMMANDO

```
100 'BEGIN
110 DIM C(15,15),D(15,15),N$(11)
,SC(11),LV(11)
150 'INTRO
160 CLS
170 PRINT@68,"ARTIFACTS RARELY F
OUND";:PRINT@133,"PROUDLY PRESEN
TS ...";
180 PRINT@203 ,"COMMANDO";:PRINT
@270,"BY";:PRINT@396,"1985";
190 PRINT@327,"ANTHONY FRERKING"
;:PRINT@455,"<PRESS ANY KEY>";
200 A$=INKEY$:IF A$="" THEN 200
210 CLS:INPUT"YOUR NAME";N$
213 GOSUB7000
215 IF N$="ARF         " THEN 230
220 GOSUB 5000
230 PMODE 3,1:PCLS:SCREEN1,1
235 IF N$="ARF         " THEN 265
240 FORI=1TO170:R=RND(8):CIRCLE(
127,96),I,R:NEXT
250 FORJ=1TO5:FORI=1 TO 8:I$=STR
$(I):DRAW"C"+I$+";BM10,60;NR30D4
0R30BR10NR20U20R20D20BR10U20F10E
10D20BR10U20F10E10D20BR10U10E10F
10NL20D10BR10U20F20U20BR10NR10D2
0R10E10H10BR20D20R20U20L20":NEXT
:NEXT
260 GOSUB5000
265 R$(1)="GARBAGE SCRUBBER":R$(
2)="COOK":R$(3)="FOOT SOLDIER":R
$(4)="MINER":R$(5)="COMMANDO 2ND
 CLASS":R$(6)="COMMANDO 1ST CLAS
S"
270 TT=0:LV=1:PH=1:SC=0:LI=3
280 PL$(1)=";L2D2R2D8L2":PL$(2)=
";L2D2R2NG4NF4D4NG4F4"
290 C$=";G5ND5R5ND5R5ND5H5U5L5D2
R5":PL$(3)=";G6ND2BU4NU2F4NE4R4N
H4E4NU2BD4ND2H4NL4H2":B$(1)=";R4
G8NR8D2NR8F4NU4E4U2H8L4D8"
300 B$(2)=";BR4G2H2G2NH2D6E2F2NU
6R2G2D2NL4G2H2U2H2R2"
310 T$=";G2D1F2L3G2NR15D1F2R11E2
U1H2L3NL5E2U1NR3H2L5NU2"
320 BL$=";NU15ND15NR10NL10NE5NH5
NG5F5"
350 'LV1
360 PH=1:AR=0:H=230:V=148:V$=STR
$(V):E=1:H$=STR$(H):R=7:Q=LV*10+
20:R=R-L:TI=0
370 PCLS(1):DRAW"C2;BM0,140;R40G
5L15D15R220U10H10R25":PAINT(0,16
0),2,2
380 DRAW"C3;BM10,130"+PL$(3)
390 DRAW"C4;BM240,130"+C$
400 'MOVE
410 DRAW"C1;BM"+H$+","+V$+PL$(E)
420 J(1)=JOYSTK(0)
430 IF J(1)<=15 THEN H=H-5 ELSE
IF J(1)>=55 THEN H=H+5 ELSE 460
440 IF H>=230 THEN H=230 ELSE IF
 H<=30 THEN 4010
450 IF E=1 THEN E=2 ELSE E=1
460 H$=STR$(H):DRAW"C3;BM"+H$+",
"+V$+PL$(E)
470 TI=TI+1
500 'ENEMY
510 IF AR=1 THEN590
520 Y=RND(2):IF Y<>1 THEN 400
530 Y=RND(2):ON Y GOTO 540,550
540 F=32:X=(RND(14)*10)+65:Y=1:G
OTO 560
```

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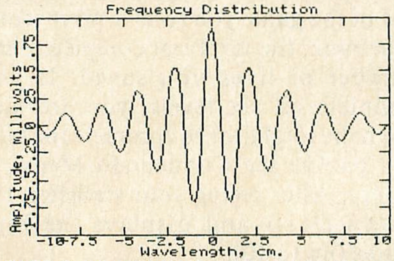

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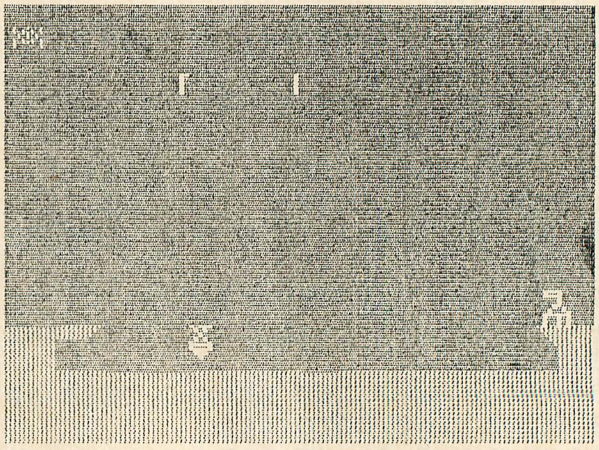
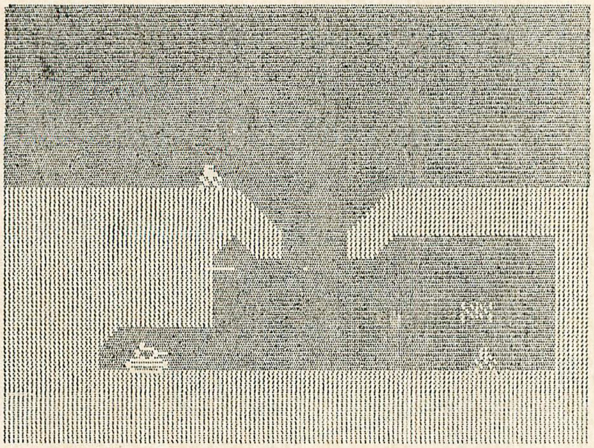
```
550 F=20:X=(RND(16)+10)+50:Y=2
560 HB$=STR$(X):VB$=STR$(Q):DRAW
"C4;BM"+HB$+","+VB$+B$(Y)
570 Z=Q:AR=1
580 GET(X-5,Z)-(X+5,Z+15),C,G
590 PUT(X-5,Z)-(X+5,Z+15),D
600 Z=Z+10:SOUND 160-Z,1:IF Z<15
0 THEN 660
610 Z=8:PLAY"V30O3T4L1C":ON Y GO
TO 620,640
620 COLOR Z,8:LINE(X-7,160)-(X+7
,135),PSET,BF
630 FORI=1TO20STEP3:CIRCLE(X-I,1
25),10,Z:CIRCLE(X+I,125),10,Z:NE
XT:Z=Z-3:IF Z<4 THEN 650 ELSE 62
0
640 FORI=1TO20STEP3:FORJ=4TO1 ST
EP-1:CIRCLE(X,160),I,J,1,.5,1:NE
XT:NEXT
650 IF H>=X-F AND H<=X+F THEN 30
00 ELSE AR=0:GOTO 400
660 PUT(X-5,Z)-(X+5,Z+15),C,PSET
:GOTO 400
1000 'LV2
1010 PH=2:N=10:H=225:U=103:V=30:
AR=0:TI=0:AA=115:AB=0
1015 Y=50:R=150
1020 PCLS(1)
1030 DRAW"C2;BM0,80;R100F20D10L1
0H10G10D30L40G10D10R200U60L70G10
L10U10E20R90":PAINT(0,100),2,2
1040 DRAW"C4;BM60,150"+T$
1050 FORI=1TOLV
1060 LINE(90,(I*5)+110)-(100,(I*
5)+110),PSET
1065 NEXT
1070 DRAW"C3;BM210,150"+PL$(2)
1080 DRAW"C4;BM90,70"+PL$(2)
1090 IF LV >2 THEN DRAW"C4;BM180
,70"+PL$(2)
1100 IF LV<3 THEN Q=1 ELSE IF LV
<4 THEN Q=2 ELSE Q=3
1110 GET(Y,R)-(Y+15,R+10),D,G
1150 'MOVE
1160 COLOR1,1:LINE(H,V)-(H+12,V+
9),PRESET,BF
1170 J(1)=JOYSTK(0):J(2)=JOYSTK(
1):FR=PEEK(65280)
1180 FORI=1TO2:IF J(I)<=15 THEN
X(I)=-5 ELSE IF J(I)>=55 THEN X(
I)=5 ELSE X(I)=0
1190 NEXT
1200 H=H+X(1):V=V+X(2)
1210 IF H>=240 THEN H=240 ELSE I
F H<=30 AND AB=0 THEN H=30
1220 IF V<=20 THEN V=20
1230 PUT(H,V)-(H+15,V+10),C,PSET
1240 IF PPOINT(H-1,V-1)=6 OR PPO
INT(H+14,V)=6 OR PPOINT(H+14,V+1
0)=6 OR PPOINT(H-1,V+10)=6 THEN
3000
1250 IF H<=30 AND AB=1 THEN 4150
1260 IF FR=254 OR FR=126 THEN GO
SUB1300
1270 TI=TI+1:GOTO 1400
1300 'FIRE
1310 IF H<200 THEN SOUND1,1:RETU
RN
1320 IF V<110 THEN SOUND 1,1:RET
URN
1330 AB=1:COLOR4,1:LINE(H+6,V+5)
-(210,135),PSET:SOUND250,1:LINE(
H+6,V+5)-(210,135),PRESET
1340 DRAW"C5;BM210,150"+PL$(2)
1350 RETURN
1400 'ENEMY
1410 IF AR=1 THEN 1460 ELSE AR=1
1420 IF Q=1 THEN 1440 ELSE Z=RND
(2)
1430 N=170:IF Z=1 THEN X=0 ELSE
X=-5
1440 Z=RND(2):IF Z=1 THEN M=0 EL
SE M=5
1450 SOUND 10,1:Z=100:T=80
1460 IF Q=1 THEN 1470 ELSE PRESE
T(N,T):N=N+X
1470 PSET(Z,T,1):Z=Z+M:T=T-5:PSE
T(Z,T,2):IF Q>1 THEN PSET(N,T,2)
1480 IF T<=25 THEN PSET(Z,T,1):P
SET(N,T,1):PSET(U,AA,1):AR=0:GOT
O1510
1490 IF T<=V+8 AND T>=V THEN 150
0 ELSE 1510
1500 IF (Z<=H+15 AND Z>=H)OR(Q>1
 AND N>=H+15 AND N<=H) THEN 3000
1510 IF Q<3 OR AB=1 THEN 1540
1520 LINE(Y-5,R-5)-(Y+11,R+10),P
RESET,BF:Y=Y+INT(LV/2):H$=STR$(Y
):V$=STR$(R):DRAW"C4;BM"+H$+","+
V$+T$
1530 IF Y+15>=210 THEN LINE(Y,R)
-(Y+16,R+10),PRESET:GET(Y,R)-(Y+
16,R+10),D,G:GOTO 3000
1535 PLAY"V30T8O1L16;C;D"
1540 IF AR=1 THEN 1560
1550 AA=RND(LV):AA=110+(AA*5):U=
103
1560 PSET(U,AA,1):U=U+5:PSET(U,A
A,4)
1570 IF AA>=V AND AA<=V+10 THEN
1580 ELSE 1150
1580 IF U >=H AND U<=H+15 THEN 3
000 ELSE 1150
2000 'LV3
2010 R2=20:S2=110:TI=0:PCLS(1):R
1=130:S1=170:HA=220:X=10:Y=160:H
```

```
=45:V=10:PH=3:AA=135:ZA=180:AR=0
:E=0
2015 R3=135:S3=130
2020 GET(20,20)-(35,35),D,G
2030 DRAW"C2;BM0,40;R100BG10G20R
20E10H10BE10F20R30F20D10L140G10D
10G10D20G10D10R30F10R170E20U130H
25"
2040 PAINT(10,100),2,2:PAINT(10,
180),2,2
2050 COLOR 4,1:FORI=1TOLV:LINE(2
20,15+(I*5))-(230,15+(I*5)),PSET
:LINE(220,85+(I*5))-(230,85+(I*5
)),PSET
2060 NEXT
2070 PUT(H,V)-(H+16,V+10),C,PSET
2080 DRAW"C2;BM50,110;D20R100E20
L120":PAINT(60,125),2,2
2100 'MOVE
2110 PUT(H,V)-(H+16,V+10),D
2120 J(1)=JOYSTK(0):J(2)=JOYSTK(
1)
2130 FORI=1TO2
2140 IF J(I)<=15 THEN X(I)=-5 EL
SE IF J(I)>=55 THEN X(I)=5 ELSE
X(I)=0
2145 NEXT
2150 H=H+X(1):V=V+X(2)
2160 IF V>=140 AND H+16 <=35 THE
N 4070
2170 IF PPOINT(H-1,V)=6 OR PPOIN
T(H-1,V+10)=6 OR PPOINT(H+14,V)=
6 OR PPOINT(H+14,V+10)=6 THEN 30
00
2180 IF V<=0 THEN V=5
2190 IF H<=10 THEN H=10
2200 PUT(H,V)-(H+15,V+10),C,PSET
2210 TI=TI+1
2250 'ENEMY
2260 IF AR=1 THEN 2300
2270 AR=1:IF V<=30 THEN 2280 ELS
E 2290
2280 T=218:M=(RND(LV)*5)+15:N=15
0:GOTO 2300
2290 T=218:M=(RND(LV)*5)+85:N=17
0
2300 PSET(T,M,1):T=T-3:PSET(T,M,
3)
2310 IF (H<=T AND H+15>=T) AND (
V<=M AND V+10>=M) THEN 3000
2320 IF T<=N THEN AR=0:PSET(T,M,
1)
2330 IF LV >=3 THEN 2340 ELSE 21
00
2340 PSET(R1,S1,2):R1=R1+1:IF R1
>135 THEN R1=130:S1=S1-1
2350 IF LV>=4 THEN 2360 ELSE 210
0
2360 PSET(R2,S2,2):S2=S2+1:IF S2
>115 THEN S2=110:R2=R2+1
2370 IF LV >=5 THEN 2380 ELSE 21
00
2380 PSET(R3,S3,2):R3=R3+1:IF R3
>140 THEN S3=S3+1:R3=135
2390 GOTO 2100
```



```
3000 'DEATH
3001 II=0
3005 IF PH >1 THEN 3040
3010 'LV1
3020 DRAW"C5;BM"+H$+","+V$+PL$(E
)
3030 FORI=150 TO 50 STEP-5:CIRCL
E(H,I),5,3:CIRCLE(H,I),5,5:NEXT:
V=45:H=H-5
3040 'LV1,LV2,LV3
3050 FORJ=1TO10:FORI=8 TO5 STEP-
1
3052 I$=STR$(I):H$=STR$(H+5):V$=
STR$(V+5)
3054 DRAW"C"+I$+";BM"+H$+","+V$+
BL$
3056 NEXTI,J
3060 LI=LI-1:IF LI<=0 THEN 3080
3070 ON PH GOTO 350,1000,2000
3080 CLS:PRINT"YOUR TEST IS OVER
"
3090 PRINT"      **RATING**"
3100 PRINT"LAST LEVEL COMPLETED:
";LV-1
3110 PRINT" # OF LIVES SAVED:";
3120 IF PH>2 THEN PRINTLV ELSE P
RINT LV-1
3130 PRINT"RANK:";:IF LV =1 THEN
  PRINTR$(1) ELSE IF LV =6 AND I
I=1 THEN PRINTR$(6) ELSE PRINT R
$(LV-1)
3140 PRINT"SCORE:";SC
3150 IF LV<6 OR II=0  THEN 3155
ELSE PRINT"TIME TO COMPLETE COUR
SE:";TT/100:GOTO 3160
3155 PRINT"PRESS ANY KEY"
```



```
3156 A$=INKEY$:IF A$="" THEN 315
6 ELSE 6000
3160 PRINT"PRESS ANY KEY"
3170 A$=INKEY$:IF A$=""THEN 3170
3180 PMODE3,1:PCLS:SCREEN1,0
3190 CIRCLE(150,50),22,2:PAINT(1
50,50),2,2:CIRCLE(150,50),30,2
3200 PAINT(150,25),3,2
3210 DRAW"C2;BM160,80;ND70G10H10
ND70L10D80E10D20E10F10U20F10U80N
L10R10U20E10H10U20L20H10G10L20D2
0G10F10D20R10"
3220 DRAW"C3;BM140,40;R20BG20R20
BH20BG5D10R7U10BR5NR7D5R7D5NL7BR
5U5NR10E5F5D5"
3230 PAINT(135,100),4,2:PAINT(16
5,100),3,2
3240 COLOR2,1:LINE(40,60)-(100,6
0),PSET:LINE(200,60)-(254,60),PS
ET
3250 DRAW"BM110,20;NH20BR80NE20B
D80NF30BL80G30"
3260 A$=INKEY$:IF A$="" THEN 326
0
3270 GOTO 6000
4000 'WIN
4010 'LV1
4020 GET(5,130)-(20,139),C,G
4030 H=5:V=130
4040 PUT(H,V)-(H+15,V+10),D
4050 V=V-5:PUT(H,V)-(H+15,V+10),
C,PSET
4060 IF V<=10 THEN 4150 ELSE 404
0
4070 'LV3
4075 IF LV=6 THEN 4150
4080 PCLS(1)
4090 DRAW"C2;BM20,85;D10R10BR5NR
10U5NR5U5R10BR5D5F5E5U5BR5NR10D5
NR5D5R10BR5NR10U10"
4100 FORI=1TO LV+1:LINE(95+(I*5)
,85)-(95+(I*5),95),PSET:NEXT
4110 FORI=1TO1000:NEXT
4150 'WIN1,2,3
4155 II=1:GOSUB5000
4156 SC=SC+(LV*100)
4157 IF TI<200 THEN SC=SC+(200-T
I)
4158 TT=TT+TI
4160 PH=PH+1:IF PH>3 THEN PH=1:L
V=LV+1
4170 IF LV>6 THEN 3080
4180 ON PH GOTO 350,1000,2000
5000 'THEME
5010 Z$="O2BG":X$="AO3C"
5020 PLAY"T6O3L4DDXZ$;ACBGO3DDXZ
$;XX$;O2L2AO3L4DD"
5030 PLAY"XZ$;XX$;O2BGAO3CXZ$;AO
3DO2L2G"
5040 RETURN
6000 'HIGH SCORE
6010 IF SC>SC(10) THEN 6020 ELSE
 6140
6020 SC(11)=SC:N$(11)=N$:LV(11)=
LV
6030 SC=0
6040 IF SC=1 THEN 6140
6050 SC=1
6060 FORI=1TO10
6070 IF SC(I)<SC(I+1) THEN 6080
ELSE 6110
6080 SC=0:S=SC(I):SC(I)=SC(I+1):
SC(I+1)=S
6090 N$=N$(I):N$(I)=N$(I+1):N$(I
+1)=N$
6100 LV=LV(I):LV(I)=LV(I+1):LV(I
+1)=LV
6110 NEXT
6120 GOTO 6040
6140 CLS:PRINT@10,"*HIGH SCORE*"
6150 PRINT"---------------------
-----------"
6160 FORI=1TO10:IF SC(I)=0 THEN
6180
6170 PRINTN$(I)"   "SC(I)"    LE
VEL:"LV(I)
6180 NEXT
6190 PRINT:INPUT"WANT TO PLAY AG
AIN(Y/N)";A$
6200 IF A$="Y" THEN 150
6210 END
7000 '1
7010 N=LEN(N$)
7020 IF N>10 THEN 7030 ELSE IF N
<10 THEN 7040 ELSE RETURN
7030 N$=LEFT$(N$,10)
7035 RETURN
7040 FORI= 1 TO 10-N
7050 N$=N$+" "
7060 NEXT:RETURN
```

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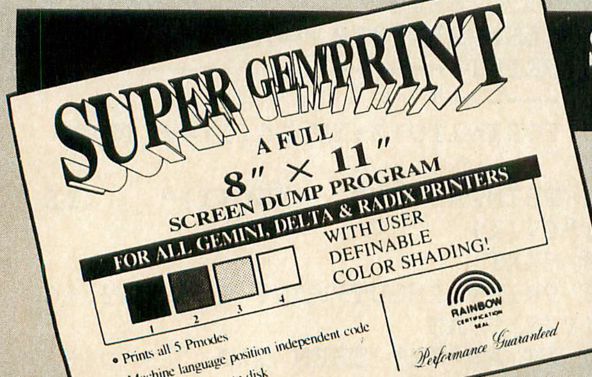

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RECEIVED & CERTIFIED

The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

MONEY MATH, a 32K ECB education utility designed for first through third grades and useful for remediation in upper elementary grades. Fifteen-level menu includes coin recognition, spelling coin names, count to $1 using pennies, nickels, dimes and quarters, and graphics are large for utilization in small groups. Cassette comes with both talking and non-talking versions on the tape. *CY-BURNET-ICS, 5705 Chesswood Drive, Knoxville, TN 37912, cassette $29.95, disk $32.95 plus $2 S/H*

26 Hardware Projects for the Home Computer, a book by Dan Cross-Cole written for the intrepid hobbyist or student and composed of such projects as peripheral interface adaptor, bidirectional port, oscilloscope video board and optical spectrometers, among others. Diagrams are included. *Dan Cross-Cole, 208 N. Abingdon Street, Arlington, VA 22201, $5.95*

French Package, a 32K education utility for home skills in learning French. Composed of drills, exercises and practices, *French Package* contains brief reviews of particular points of grammar and is capable of addition and modification to coincide with personal texts and/or classes. *David M. Compton, 252 N. Main Street, Suffield, CT 06078, disk $39.95 plus $3 S/H*

The Enhancer Version 6.0, a 64K programming utility designed to reside above Disk BASIC and featuring these commands: RECOVER, to retrieve programs from accidental usage of `NEW`, BREAK key disable; HIPRINT, to display all print in Hi-Res; SCROLL, to freeze portions of the screen and change the home position; and CUSTOM, to allow creation of special characters (disk version only). *H.D.R. Software, 27 Doyle Street, St. John's Newfoundland, Canada, A1E2N9, cassette or disk $18*

Algebra, a 32K mathematical utility requiring a disk drive designed to act as a string variable equation solver capable of solving for any variable in any equation composed of the integers zero through nine, letters A through Z and the functions of addition, subtraction, multiplication, division, in parentheses multiplication and exponential. *MF Estes Softhead Co., P.O. Box 335, Elba, NY 14058, disk $49 plus $3 S/H*

SGS, SemiGraphics Support Utility, a 5.3K graphics utility requiring a disk drive. This revised version's enhancements include printing of screen images to a Gemini or Epson printer, 18 commands added to BASIC, copy protection after systems loading and a revised users manual. *Micro Computer Systems, 1404 Sunset Drive, Friendswood, TX 77546, cassette $14.95 disk $17.95*

XMENU, a 64K OS-9 utility to allow the creation and maintenance of menus to access OS-9 commands. *Microtech Consultants, Inc., 1906 Jerrold Avenue, St. Paul, MN 55112, disk $29.95, with source $59.95 plus $3 S/H*

XDIR & XCAL, a 64K OS-9 utility package to allow users to print full hierarchal directories with full sorting, complete pattern matching and wild card and character classes with *XDIR*. *XCAL* calculates for programmers and general usage. Features include ability to work in hexadecimal, decimal and binary, the functions AND, OR, NOT, XOR and 25 results are stored. *Microtech Consultants, Inc., 1906 Jerrold Avenue, St. Paul, MN 55112, disk $24.95, with source $49.95 plus $3 S/H*

XTERM, a 64K OS-9 communications package that works with normal text screen, *XSCREEN* or the *Word-Pak* 80-column board. Features include: full upload and download ability with remote buffer operation; support of XON/XOFF protocol, five, six, seven or eight bits; even/odd/no parity; and the ability to execute an OS-9 Shell command from within the program. Works with standard serial interface as well as a hardware serial port. Comes with XMODEM protocol and function keys. *Microtech Consultants, Inc., 1906 Jerrold Avenue, St. Paul, MN 55112, disk $59.95, with source $99.95 plus $3 S/H*

XSCREEN, a 64K OS-9 utility to create Hi-Res screens with 24 lines of text with 51, 64 or 85 characters per line. Characters can be either white on black screen or vice versa. *Microtech Consultants, Inc., 1906 Jerrold Avenue, St. Paul, MN 55112, disk $19.95, with source $39.95 plus $3 S/H*

XWORD, a 64K OS-9 word processing utility. Features include: true character oriented full-screen editor, support of normal text screen, *XSCREEN*, *O-PAK* or *Word-Pak* 80-column card, full block commands for block manipulation, full find and replace commands with wild card characters, proportional spacing formats supported, printer control, headers/footers, page numbering in decimal or Roman numerals and margin differentiation for even and odd pages. *Microtech Consultants, Inc., 1906 Jerrold Avenue, St. Paul, MN 55112, disk $79.95, with source $139.95 plus $3 S/H*

XSPELL, a 64K OS-9 word processing utility to allow checks for spelling errors in OS-9 text files. Comes with 20,000- and 40,000-word dictionaries. *Microtech Consultants, Inc., 1906 Jerrold Avenue, St. Paul, MN 55112, disk $44.95 plus $3 S/H*

XMERGE, a 64K OS-9 utility to allow users of *XWORD* to mail merge or merge in data from data files or the keyboard. *Microtech Consultants, Inc., 1906 Jerrold Avenue, St. Paul, MN 55112, disk $29.95, with source $59.95 plus $3 S/H*

CoCo Windows, a 64K utility requiring a disk drive to give users a Hi-Res 51 by 24 character screen display with windows and enhanced keyboard with key click. Users can create multiple windows from BASIC using character control codes including menu-driven printer setup, function key programming, auto-line numbering for BASIC and four-function calculator with memory. *The Other Guy's Software, P.O. Box H, Logan, UT 84321, disk $19.95 plus $2.50 S/H*

Connections: Telecommunicating On A Budget, a 248-page, soft bound book by Robert Chapman Wood to help guide beginners through the different stages, outlets and services of telecommunicating. Comes with an index and nine pages of discount coupons and special offers. *Scott, Foresman and Company, 1900 East Lake Avenue, Glenview IL 60025, $15.95*

The CoCo Knitter, a 32K home utility designed to produce the instructions necessary to knit a variety of sweaters. Menu-oriented, the program allows choices of various weights of yarn, neckline styles, sleeve variations and sweater front styles. Instructions can be generated for any of 40 sizes and dumped to most printers. *Sugar Software, 1710 North 50th Avenue, Hollywood, FL 33021, cassette or disk $24.95 plus $1.50 S/H*

TRADING POST, a 32K educational game requiring a disk drive. Two students play the game using strategy and problem-solving skills to be the first to collect all shapes needed to match a goal. Graphics are used to keep attention levels up as students practice memory, cognitive and creative skills. Comes with teacher's guide. *Sunburst Communications, Inc., 39 Washington Avenue, Pleasantville, NY 10570, disk $59*

SUPERDISK UTILITY, a 32K utility requiring a disk drive and featuring the capabilities to make a spare copy of Track 17, display the directory when using the `KILL`, `COPY` and `RUN` commands, and reading a disk by file, track or sector. *Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322, disk $9.95*

RADIOLOG.4 & RADIOLOG.5, a 32K Ham radio utility requiring a disk drive. Ham radio operators can maintain and print out their log book using their CoCos. *Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322, disk $9.95*

The Electronic Assistant Lighting Designer, a 64K utility requiring a disk drive that acts as a database manager in producing and maintaining the lists, schedules and supports necessary to design lighting for theatrical productions, as well as assessing the capabilities of lighting instruments according to tasks assigned and flagging errors to the user in cases of overload. *Theater Literate Software, 1361 Springfield St., Kissimmee, FL 32743, disk $50*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Monica Dorth

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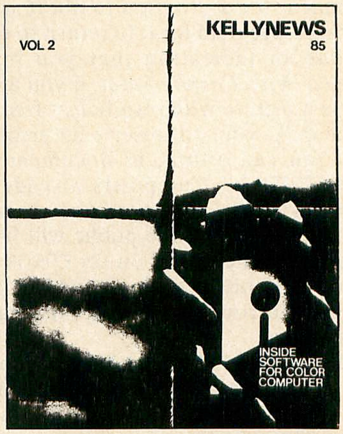
If you live in Canada and you own a Color Computer, you should have a copy of our latest Catalog. We distribute most of the software available for the Color Computer. Our Catalog also contains articles, reviews, and tips for the Canadian COCO user. We are also avid OS-9 and hard drive users.



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REVIEWING REVIEWS

COSMIC PAINT

Editor:

Concerning the review of my program in the November issue [Page 193], I would like to make these comments.

Most of the "quirks" that Mr. Rahim criticized in the program were quite intentional. The only unintentional one was the problem with the `PCLEAR` bug in the original Color Computers. I was surprised to find that he, as an owner of an older Color Computer, failed to mention that *Cosmic Paint* is one of the only major graphics editors on the market that runs in 32K. It is one of the minority of programs that will even operate on an unmodified gray machine.

Originally, a BREAK key disable was included in the coding of the program, but while using the program to write a screen for a separate animated graphics program, I needed to have a line going from one numbered coordinate to another. I could not get out of the program to type in the `LINE` statement, which would perform the action. After removing the BREAK disable coding, I was able to easily move back and forth between the program and immediate entry modes.

About the problem with this program being "crashable": I find it much more convenient for a program to abort with an error message than for it to return to editing without an indication that you made a mistake. With *Cosmic Paint*, if you attempt to save a picture with insufficient free space on the disk, you will receive an error message. You can return, as documented, by typing `GOTO 20`. Computers provide error messages because programmers cannot anticipate every use the public will find for a program. The use of an `ON ERROR GOTO` statement is often a simple way to dodge hardware errors by having the program ignore them.

About the `PAINT` error, this is not an error with the program; it is a problem with the Extended BASIC `PAINT` command. Since the coding of the command itself is recursive, it can easily eat up a lot of memory for a short time. After the `PAINT`ing is complete, the memory is returned. As mentioned in the manual, it only shows up when painting something very complex (like an eight-bit pattern washed over most of the screen). It is simple to recover and you will know exactly what went wrong.

Some apparent fundamental problems can allow more user-convenience than the first glance shows.

John Hattan
Cosmic Software

WORD-PAK II

Editor:

I find the comments, by D. Dean Rector of Midland, Texas, in the "Reviewing Reviews" of the December 1985 issue [Page 222] a little harsh.

I purchased *Word-Pak II* from PBJ in October 1985. I, too, found the screen editor clumsy to work with and a little slow. My thanks to Mr. Rector for the two pokes to disable the editor.

The documentation supplied with *Word-Pak II* is a little on the thin side, but there is enough to get the board up and running.

The slow scroll advertised is indeed slow, but you can change the scroll speed from zero (for very fast) to 255 (for very slow). The zero speed looks the same as a normal scroll.

He also complains of having to reset the computer to get back into the standard 32 by 16 screen format. This is true, but with one look at the 80-column screen on a CoCo, why anyone would want to go back to the 32 by 16 screen is beyond me.

My opinion of *Word-Pak II* is that if you look at the product as an 80-column screen driver, the product is well worth the money invested. The screen editor, slow scroll and software switch are all just icing on the cake.

I'm running *Word-Pak II* on a gray 64K CoCo with two drives and a Multi-Pak Interface. I'm writing this letter from deep inside OS-9 and using *Word-Pak II*. Writing a letter now is like a walk in the park.

Allen Genitski
Augusta, GA

CITY WAR

Editor:

In reviewing *City War* [December 1985, Page 246], Dan Smith pointed out some aspects of the game he disliked—I would like to address these points.

First, he states that using the "Arm" and "Unarm" options while a player's missiles are already armed or unarmed unnecessarily costs a turn. True; this is by design. These options allow a player to sit out a turn and wait for the other player to make a move. We don't suggest this as a playing habit, but this "non"-option allows the possibility of capitalizing on the other player's inattention to missile count.

Second, Mr. Smith disliked how *City War* re-prompted incorrect input during launch sequences. This is due to BASIC's `REDO` error, which occurs when letters or symbols are entered when numeric input is expected. The instructions state repeatedly that cities' numbers, not names, are asked for.

Lastly, he states that he saw no need for access codes and the "Reduce" (missile count) command served no purpose. It appears Mr. Smith reviewed the game by playing it solitarily or had unusually honest opponents. Toby Skoal, the co-author of the game, and I played many times and took advantage of every opportunity to cheat and strengthen our positions at the other's expense. This made access codes imperative. While the "Reduce" command plays no big part in advancing the game's progress, it is vital to the interaction between two players pitting their strategies against each other.

City War is not a Simulation, but a game; any similarity to the movie *War Games* was never intended.

Dan Tharp
Co-author of City War

COCO GARDENER

Editor:

Thank you for the opportunity to comment on Larry Goldwasser's review of our program *CoCo Gardener* [Page 204].

First, regarding Mr. Goldwasser's problem of not knowing exactly how to load the program — our tapes have the loading instructions printed on the cassette label. The program name itself is, of course, unnecessary.

Second, let me make a single comment on all of the other "problems" mentioned. They are merely differences in opinion. For example, the first problem is that the black bar was found to be "difficult to interpret." Well, if the black bar has dwindled to half of its original size it means that the garden space is half used up. We don't think that is difficult to interpret at all, and we much prefer the bar graphics to the numerical approach he suggests. We could respond similarly to his other "problems."

As Mr. Goldwasser says, "the program offers some very good features." And though we appreciate his attempts to help us by suggesting revisions, we really do prefer the program in its current form.

Jim Toth
Tothian Software, Inc.

We welcome letters to "Reviewing Reviews" and remind you that they may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

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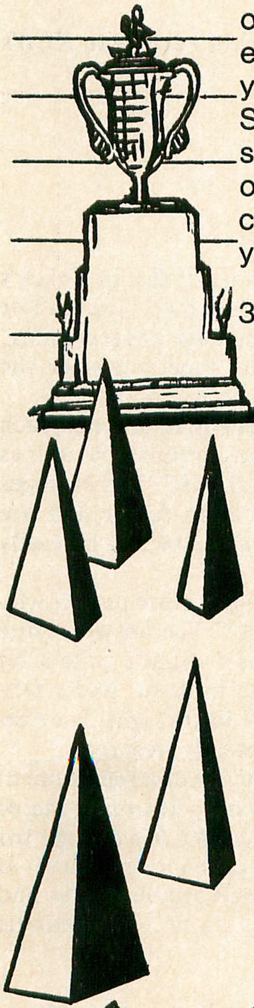
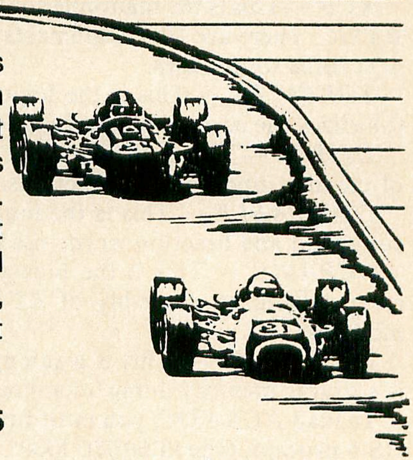
SPEED RACER

by Steven Hirsch





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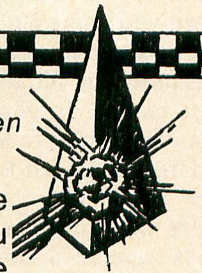
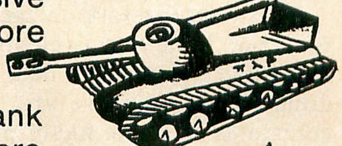
ROMMEL 3-D

By Kary McFadden





You clutch the tank controls, searching for any sign of the enemy. Suddenly a blip appears on radar! Frantically, you move your tank into position. At last you spot the elusive enemy tank! Facing it, you race to lock sights and fire before he does!

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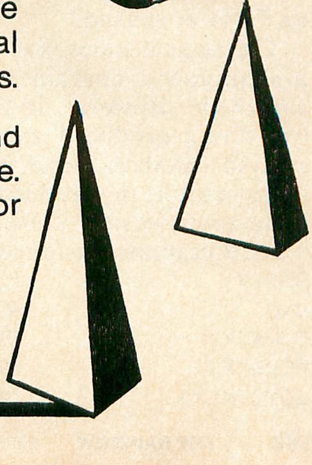

32K Color Computer Required. **$29.95**

Kansas City BASIC Scores a Home Run

Since the Kansas City Royals won the 1985 World Series, this seems an appropriate time to review *Kansas City BASIC (KCB)*. *KCB* is an inexpensive BASIC interpreter for OS-9 written by Steve Odneal. In order to use *KCB* you must have a 64K Color Computer, at least one disk drive and OS-9 Level 1 Version 1.00.00 or later. While it does not have the power to rival BASIC09, *KCB* should be considered before buying a BASIC language for OS-9.

KCB is distributed on a Radio Shack Color Computer OS-9 formatted diskette. There are six files on the distribution disk:

KCB — This is the main-line source code for *Kansas City BASIC*. There are USE statements in *KCB* that pull in the next three source files.

TOKENIZE — This is the logic that tokenizes and detokenizes the command and function words used in *KCB*.

DISKIO — This is the logic for *KCB* that handles most of the disk input/output functions.

CMDTABLE — This is the look-up table for all of the command and function words used in *KCB*.

KCBASIC — This is the binary load module that was created from an assembly of *KCB* and the other source modules.

MEMDUMP — This is a sample program for *KCB*. It is a simple memory dump/examine program.

To load *KCBASIC*, you must first boot OS-9, then at the OS-9 prompt, type `KCBASIC #xxK`, where xx is the amount of memory you want *KCB* to have. This needs to be done so you will not run out of memory for your BASIC program. From this point on, *KCB* performs like Radio Shack BASIC to a large extent. In general, the syntax of *Kansas City BASIC* is very similar to Microsoft BASIC used under Radio Shack's Disk Extended BASIC. It even supports the use of the '?' for the `PRINT` command, however, not all of the capabilities are implemented. For example, no graphics commands have been included.

KCB only supports integers from -32768 to 32767 (the Hex and binary equivalents, also). BASIC programs are saved and loaded from disk in ASCII text format. This is done so you can use any text editor or OS-9's EDIT command to create BASIC programs. *KCB* does not have an EDIT command.

The manual states that variables can be any one or two alphanumeric characters, of which the first must be alphabetic. However, in the version I reviewed, numeric characters produced an error. *KCB* does not support arrayed variables, either. The author needs to make some improvements in variable handling in order to make *KCB* a top-notch version of BASIC.

KCB supports the following functions:

```
ABS(X)
AND
CHR$(X)
HEX$(X)
JOYSTK(X)
MID$(X,Y,Z)
RIGHT$(X,Y)
RND(X)
MEM
OR
LEFT$(X,Y)
STRING$(N,<char>)
PEEK(X)
```

Arithmetic and Compare Operators:

```
/
-
>
=
>=
*
+
<
<>
<=
```

Direct Commands:

```
$ (fork)
SAVE
LOAD
LLIST
NEW
LIST
QUIT
```

Program Control Commands:

```
RUN
REM or '
LET
PRINT USING
INPUT
GOTO
RETURN
STOP
ONERROR GOTO
CLS
FORK
PRINT or ?
PRINT @
IF/THEN/ELSE
GOSUB
FOR/NEXT/STEP
END
RESUME
```

The last two (`ONERROR GOTO` and `RESUME`) deal with *KCB*'s error-trapping routine.

Disk I/O Commands:

```
OPEN
LOF
GET #
INPUT #
PRINT #
CLOSE
EOF
PUT #
```

As you can see, *KCB* supports most of Radio Shack's BASIC commands and adds a few of its own. The author states if you are good at machine language programming, feel free to add other commands and functions since the source code is included.

The documentation on *KCB* is excellent. It does not teach you BASIC (refer to your BASIC manuals for this), but it does describe every detail of *Kansas City BASIC*. The 24 pages of documentation come in a three-clasp folder and are printed on a dot-matrix printer (which can still be easily read).

You might be thinking, "If BASIC09 has more power, why should I consider *KCB* over BASIC09?" The answer, quite plainly, is price. BASIC09 costs $99.95 — that's quite a bit of money just to be able to program in BASIC under OS-9. *Kansas City BASIC* costs only $25! That's right! For one-fourth of the money, you get an excellent interpreter.

In conclusion, *Kansas City BASIC* is not a replacement for BASIC09, but if you do not plan on performing major applications in BASIC under OS-9, then *KCB* is the one for you in the combined aspects of performance and cost. If the author fixed the problem with the variable names and added arrayed variables, *Kansas City BASIC* could handle major applications.

(Steve Odneal, 8609 East 73 Terrace, Kansas City, MO 64133, $25)

— John R. Curl

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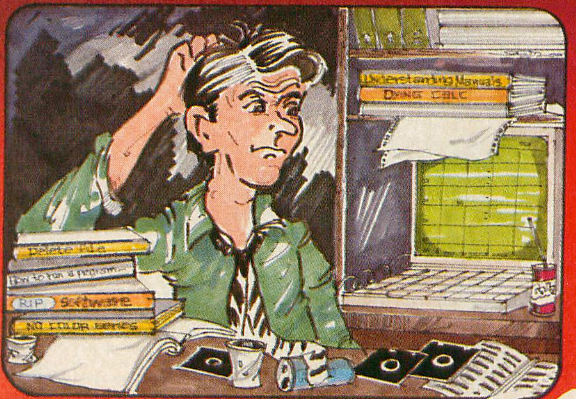

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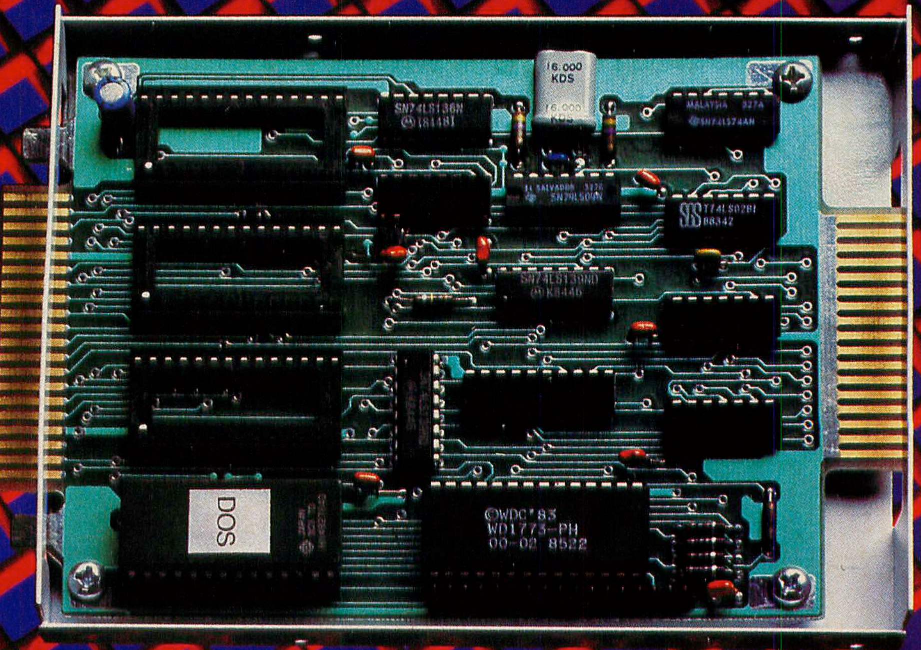

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RTIME

The second is a Real Time Clock. This is a clock chip that will keep the proper time, date and year. A small battery keeps the time when the Computer is off, retreive and set the time by using simple Basic POKES. Also available with the Real Time Clock is the optional Centronics Compatible Parallel Printer adapter. Software to set the clock and printer driver included.

MPROM

The third is a Mini EPROM Programmer. Yes, a low cost programmer that attaches to the disk controller. A must for the DISTO Super Controller. Program those often used utilities into EPROM and plug them directly into your controller. Will program 2764's or 27128's, a perfect mate for the DISTO Super Controller.

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CREDITS:

The DISTO Super Controller, add-ons and all its documentation are conceived and designed by Tony Distefano. The DISTO Super Controller and add-ons are manufactured and distributed by; C.R.C. COMPUTER INC.
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Warp Factor X is an Excellent 'Trekker' Simulation

As a long-time "Trekker" and self-styled Starfleet captain, I have searched long and hard for a quality Simulation of one of my favorite adventures. When *Warp Factor X* from Prickly-Pear Software arrived, my hopes were set high for a good *Star Trek* Simulation. I was not disappointed. In fact, of the four or five "Trek" Simulations I have experienced, *Warp Factor X* clearly provides the best overall package.

The program comes in an attractive fold-over plastic binder with a nine-page instruction manual. The documentation does an adequate job of explaining the program, even if it is difficult to understand initially. Users are warned not to use the original disk for playing purposes because the drive is accessed often for both reads and writes.

Prospective "Captains" (initial status is a "Cadet") must first log in their names and serial numbers before venturing into Federation space. After some quick configuration questions, the game is underway. The objective of a commander is to emancipate all starships, bases and planets from the domination and repression of the Klingons. In the case of planets, you must destroy all Klingon defenses and stage a successful invasion/alliance with the subsequently neutral planet. The starship commander is much less merciful, however, when it comes to bases and enemy starships, which must be destroyed. There is a total of 18 different sectors to be secured, each with its own characteristics and set of data.

To achieve these goals, the starship commander has a myriad of commands available. Through these two-letter commands, today's Captain Kirks can call the warp and impulse drives, phasers, shields, scanners and a fully implemented tracking computer to their disposal immediately. The function of these devices is fairly straightforward to experienced "Trekkers," but a thumbnail sketch is in order:

Shields — Protect ship and store energy that may be transferred in critical situations.
Phasers/Torpedoes — Offensive firepower of ship.
Warp/Impulse Drive — Provide both short and long range movement.
Scanner — Provides information on friendly and hostile ships, bases and planets; aids combat.
Ship's Computer — Collects data on the position of known objects in current sector.

Inevitably, it is not long after a captain enters an enemy controlled sector that the ship is attacked by hostile craft. The Klingons in *Warp Factor* are particularly difficult because their battle style is quite advanced. Unlike many other Simulations, these antagonists fight with common sense: They run when their energy starts to get low, they attempt to dock at Klingon outposts, and scheme to lure you near one of their planets so your ship can be hit from both sides. This factor alone makes the game very enjoyable to play because the outcome is always unsure. Even a full-fledged admiral can be defeated by a strong enemy fleet.

Although the game is heralded as "The Ultimate Graphics Simulation Game," the graphics are weak at best. The long range scanner and the display that depicts warp movement are adequate, but not spectacular. Certainly some of the extra disk space could be used for enhanced graphics routines, as the great bulk of the program is spent in text mode. The existing graphics are certainly a nice touch, but fall short of being "Ultimate Graphics."

Warp Factor, however, is an excellent Simulation of the *Star Trek* adventures. Great care has obviously been taken to ensure the playability and logic of the program. The scoring system, which allows a player to continue his game at anytime with no penalty, is of monumental utility. The cunning and poise of the Klingons in battle is a major step towards excellent CoCo Simulations, even though it could use some minor refinements.

I wholeheartedly recommend *Warp Factor X* to anyone in need of a good *Star Trek*-type Simulation. The program is an excellent implementation that provides many hours of entertainment without becoming dull. *Warp Factor X* is a program you will keep coming back to after the "hottest" video game has sat on the shelf for months.

(Prickly-Pear Software, 2640 North Conestoga Avenue, Tucson, AZ 85749, $34.95 plus $1.50 S/H)

— Eric Oberle

Adventure Contest Update

The judging of THE RAINBOW's Third Annual Adventure Contest is underway, as we have begun the journey through the maze of entries that have poured in from all parts of the world. Undertaking the CoCo Adventure world's most exciting assignment has evolved into an Adventurer's fantasy. We have been so intrigued by this year's entries that staying away from them hasn't been easy. Still in the early stages of judging, we have spent days traveling through domestic estates and foreign castles; trounced through everything from treacherous jungles to magical wonderlands; blasted off to far away galaxies; and ended up in a different time dimension, not unlike the "Twilight Zone."

But, when the CoCo must be turned off, and our minds slowly slide back into reality, we remember that there are thousands of other Adventurers out there anxiously awaiting their chance to endure the challenges and agonies of the winning Adventures. Although judging the entries that have already been viewed has been thrilling, our venture through the remaining stack of entries must be continued. Then, the scores can be tallied and the winners chosen, and we will announce the results in the April 1986 issue of THE RAINBOW. Also, for everyone who can't wait to see what all the excitement is about, two programs, considered to be the best, will be published in the same issue. Of course, a fantastic collection of some 25 of the remaining winning programs can be thoroughly explored when *The Third Rainbow Book of Adventures* is released later this year.

We realize there are many programmers out there with great Adventure ideas and creations who missed out on entering this year's competition. Well, now would be a good time to prepare for THE RAINBOW's Fourth Annual Adventure Contest. Watch for an announcement in an upcoming summer issue!

— Contest Judges

Marooned Stages an Extraterrestrial Adventure

Adventure games serve as an escape for me. There is no way I can think about the office, the bills, the weather or anything else while I am pitting my analytical skills and dumb luck against an Adventure game (or actually, the game's programmer). Through the game, you leave your present environment and are taken into the Adventure's setting. No longer are you bound by reality or mortal limitations. You play by the rules of the game; what limitations there are, you have to find.

Saguaro Software has released a new Adventure where the limitations are extraterrestrial. Called *Marooned*, the game's premise is that a strange spacecraft has landed and, being a curious creature, you are drawn to the ship, enter it and are whisked away on a journey to a mysterious red planet. Your mission is to venture through the spaceship, discovering what you can, and by using these discoveries, safely land the craft — or at least survive the landing.

Ah, but things do not stop there. Once you figure out how to control the spacecraft and land it, part two of *Marooned* begins. Then you must survive on the red planet and figure out how to get back home. This is no easy task.

Marooned uses most of the capabilities of the CoCo to provide an interesting and exciting Adventure. It is a graphics Adventure game using high resolution and artifacted moire colors with very detailed images to illustrate your location and give hints to solving the Adventure. It is not enough to just read the clues, you must also look around to figure out where you are and what is a logical thing to do in this situation.

In addition to great graphics, *Marooned* uses sound and animation. When the spacecraft lands, you see the silver orb touch down on the field as well as hear it come down. While these enhancements are not necessities, they make the Adventure more realistic and enjoyable. However, such complexity requires a 64K Extended BASIC CoCo with a disk drive. The program accesses the disk to redraw the screen as you move about, and to reference its master library when a command is given.

The vocabulary of this Adventure is quite large. With a lot of Adventures, you get "I don't understand" responses when your command is not in its vocabulary. You don't get much of that in *Marooned.*

If you get tired of playing and wish to return to reality, *Marooned* gives the opportunity to save the game and reappear where you were at a later time. You can also use this option if you fear that a move could result in your doom. In *Marooned*, reincarnation is a possibility by just reloading the saved game.

Overall, I found *Marooned* to be an exciting, engrossing Adventure. The graphics are outstanding, and the plot and method of deduction necessary to solve the puzzle are rational. The only frustrating thing I found is the lack of description of objects in some rooms. What do you call the big box with the flashing lights? The description says "you see nothing," but there is a big box with flashing lights standing right there. You must figure out what it is before figuring out what you can do with it. Experienced Adventurists will breeze past this obstacle. Novice players will have some difficulties here.

If you have a wish to leave the bounds of earthly entrapments and do some Adventuring in space and on a red planet, *Marooned* may be your ticket.

(Saguaro Software, P.O. Box 1864, Telluride, CO 81435, disk $29.95)

— Bruce Rothermel

One-Liner Contest Winner. . .

I use this program in my capacity as an assistant Brownie leader. It prints out name tags that are used on outings. I will sometimes expand on it by adding our troop number, depending on where we go.

The listing:

```
1 FORA=1TO5:INPUTA$:PRINT#-2,CHR
$(27) CHR$(14):PRINT#-2,TAB(2)"M
Y NAME IS":PRINT#-2,CHR$(13):PRI
NT#-2,A$:PRINT#-2,CHR$(13):NEXT
```

Jo Ann Karaffa
Wilmerding, PA

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

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VIDCODIT Video Digitizer is a Real Gem for Image Processing

I was excited when I was given the opportunity to review the VIDCODIT Video Digitizer. Being an amateur radio operator and a long-time follower of slow scan television (SSTV), I've always been curious about new ideas in video image processing. Kinney Software has developed a neat package for digitizing, displaying and saving video images. The video source can be from a VCR, a video camera or other sources of standard NTSC video.

The materials supplied for this review consisted of a working model of the digitizer, the software on disk and a pre-drilled, bare printed circuit board. (It should be pointed out that the digitizer is supplied only in the form of the bare circuit board and software on either tape or disk. No assembled units are available since this is a build-it-yourself project; that's one reason the price is so reasonable.) The working model was furnished so a quick evaluation of how it works could be made — and a quick evaluation it was. After I hooked up the cables to my right joystick and cassette ports, I connected my black-and-white TV camera to the digitizer input.

After loading and executing the machine language program, a title page and credits appear on the screen. Hitting 'M' brings up the menu page from which all subsequent operations originate. The menu provides for three, five or seven shades of gray and different "dither" patterns used to create the illusion of various shades of gray. The `PMODE 4` format used results in a borderless picture with a resolution of 256 by 192 pixels. While the small number of gray shades limits the overall picture quality, it's not bad and really needs to be seen to be believed.

Other menu options are:

H — Hold for constant viewing.
A — Automatically selects each gray level in sequence and constantly updates the display.
P — Positive video (normal picture).
N — Inverted video (negative picture).
R — Repeat. Continously cycles in the same gray level and dither pattern. Used to adjust the brightness and contrast controls for the most pleasing display.
Q — Quit. Option is used when ready to exit the program, save the image to tape or disk, or to get a hard copy on your printer.

I used the digitizer and my camera to photograph pictures out of magazines, my kids and even the family dog! All looked very nice, although movement of the subject matter is somewhat of a problem since the digitizing process takes about three or four seconds. Best results are obtained on stationary objects.

No external power supply is needed since power is derived from the joystick port. The cassette relay in the CoCo is used to reset the digitizer for each subsequent frame. To print the digitized picture you must exit the program and use any graphics screen dump program for your particular printer.

I was so impressed with the operation of the assembled model that I decided to build one for myself. I attended a local "hamfest" and purchased all the components needed for less than $15. If you figure the added cost of the board and software at $39.95 plus $2 for shipping and handling, the total cost came out to about $57. If you already have an assortment of resistors and capacitors, chances are you could put one together for even less money. All of the parts, including a plastic or metal project box, can be purchased at Radio Shack stores. The instructions consist of a parts list, schematic and board layout. It's not hard to build but some experience in soldering to printed circuit boards is necessary. I spent one evening getting mine up and running.

For the money, you can't go wrong with this little gem. You don't get the number of gray shades as with some of the more expensive models, but then they all cost a lot more, too. And besides, this unit does not plug into your expansion port like the others do, so you don't need a Y-cable or multislot interface if you're using disk.

You know, I've been thinking . . . with my CoCo, camera, printer and VIDCODIT Video Digitizer, I could run a booth at the next State Fair and make some money printing those "computer pictures"!

(Kinney Software, Dept. 1, 121 N. Hampton Rd., Donnelsville, OH 45319, $39.95 plus $2 S/H)

— Jerry Semones

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GRAPHICS — CLS, SET, POINT

CASSETTE — LOAD, SAVE, CLOSE, LOADWS, SAVEWS, AUDIO, MOTOR, SKIPF

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Requires a 32K Radio Shack Color Computer with Extended BASIC. Disk version requires RS DOS 1.0 or 1.1.

Price: $39.95 Cassette, **$49.95** Disk plus $2.00 shipping and handling ($5.00 foreign). VT residents add 4% sales tax. Send check or money order.

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CBASIC: A Complete Editor/Compiler Well Worth its Price

By Dale Shell

The most complete editor/compiler I have seen for the CoCo, *CBASIC* is a programming system designed for a 32/64K Color Computer with at least one disk drive. The documentation states that it will take full advantage of the 96K of address space available if 64K is installed. I did not have the program long enough to try out all the options because they are very extensive. They include, but are not limited to, having built-in Hi-Res and 80-column drivers.

CBASIC supports both PBJ's and Double Density's 80-column cards, but there is a small catch if you plan on marketing your software. Cer-Comp grants the owner of *CBASIC* a limited license for incorporating it to create marketable software as long as it does not include the use of the high resolution screen or 80-column video drivers generated by the compiler. If this is done the author must agree to the following: 1) No reproduction of *CBASIC* documentation; 2) Author or publisher must supply Cer-Comp with a complete copy of the finished software package within 30 days of first publication; and 3) Th author or publisher must pay a royalty of $5 for each cop of the program produced, paid quarterly. This needs to b kept in mind if you have software you might want to market

You can use the 80-column or Hi-Res displays with th editor without having to incorporate these screens into you compiled program. The default screen is 51 characters. Lin numbers of the BASIC program are limited to four digits i length, but 9,999 lines should cover most programs.

The editor is a very good one and could be the subjec for review all by itself, so I will try to go over the feature I considered exceptional. Most of the regular BASIC editin commands are available, i.e., `LIST`, `RENUM`, `DELETE`, `LOAD` etc. The "EDIT line number" command has been replace by two commands, LEDIT and AEDIT. LEDIT (line edit works similar to BASIC `EDIT` but the arrow keys are use to go to the letter you want to change — the SHIFT-dow arrow to delete and a SHIFT-up arrow to insert spaces. Th SHIFT-left and right arrows move to the beginning and en of the line. The SHIFT-@ key toggels the multiple characte insert mode on and off. The AEDIT (auto edit) works th same, except the ENTER key is used to replace the old lin with the new one and the editor automatically moves to th next line and stays in the `EDIT` mode. The BREAK key i used with AEDIT instead of ENTER to exit the `EDIT` mode

COPY and MOVE are two other very powerful tools COPY allows you to copy a portion of the program t another place in the program and, if necessary, it automatically renumbers upon completion of the copy. The portio copied is left intact so you will have two copies of tha portion. The MOVE command works almost the sam except the orginal lines are removed from the program. Th editor also uses the AUTO command for auto-line numbering as you enter the program, and RDELAY is used fo auto-key repeat.

BRATE is used to set the Baud rate or set the output t the PBJ parallel printer card. Except when you are usin one of the 80-column cards, one of nine different scree width formats can be selected. Your choices are 28, 32, 36 42, 51, 64, 85, 128 or 255. Of course the last three ar unreadable, but are useful for seeing print formats. A mentioned earlier, the default is 51 characters per line. Th 51 characters are not for the 80-column cards; if you hav the PBJ *Word-Pak II*, SRATE can be used to disable o alter the smooth scroll rate. *CBASIC* also allows fo protecting screen lines. This is great for protecting progra menus. It can also be used with mixed text and graphics.

One place where *CBASIC* is similar to other compiler is that it uses decimal numbers from +32767 to -3276 (sorry, no real numbers). Numeric variables are limited lik regular BASIC to one- or two-letter names or a single lette and one digit. Variable names can be longer but only th first two are used by the compiler. Dimensioned arrays ma be one or two dimensions only. *CBASIC* considers a simpl variable as the same as the first element in the array wit the same name, i.e., A=A(0,0). *CBASIC* uses base zer subscripting. It does include a scheme to deal with number larger than the basic two-byte representation. It does it b using two variables to store each 32-bit number. Similarly it has a scheme for extended and decimal addition an subtraction. One other thing to keep in mind is that variabl values are not zeroed as in powering up in BASIC; there i always "trash" left in memory but *CBASIC* includes simple three-line routine that accomplishes this. Be sure yo use it.

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String operations are *CBASIC*'s greatest assets. It features a complete set of string processing capabilities. This is one of the big advantages that sets *CBASIC* apart from other compilers. Just as in BASIC, string variable names consist of one or two letters or one letter and a digit followed by a dollar sign. The difference with strings comes with the dimensioning. If a string variable is not dimensioned, it is assigned a length of 32 bytes. If it is dimensioned, it must be done before it is used. A string variable or array may be declared to have a size of one to 255 characters in length. Unlike numerical arrays, string arrays may only be one dimensional. However, the `DIM` statement is used to specify the string size so a string array will have two subscripts in the `DIM` statement, one for the variable length and one for the array size. *CBASIC* includes most all string functions available in ECB.

CBASIC supports many options that are not available in BASIC. `ON RESET GOTO` is supported in case someone hits the Reset button during program execution. It also supports an `ON ERROR GOTO` statement that is very handy, especially when used with the TRACE command while debugging a program. Additionally, *CBASIC* supports many Interrupt Flag statements along with most of the low resolution and high resolution graphics and play statements. Tape and disk I/O statements are supported with a few modifications. This is where you have to be very careful. I/O operations do not always work exactly the same as BASIC. If you are aware of this, there may be no problem, but with disk and tape I/O, you must be careful and maybe use a little experimentation (always include a backup of the program and data).

CBASIC is a very complete compiler, but there are a few things I would like to see improved. My biggest complaint concerns the documentation. It is about 100 pages long and parts of it are good but, while a few example programs are listed, there are not any examples of a compiled printout. The information may be sufficient for someone who is already familiar with *CBASIC*, but I am a firm believer that there can never be too many examples. The best manuals are the ones that assume the reader knows nothing. You can always skip over parts you already know.

Also left out of the documentation are the instructions on how to include the 80-column drivers in the compiled version. A quick call to Cer-Comp gave the answer: use the HIRES command. When I called Cer-Comp on several occasions for help, it was readily available. Cer-Comp knows this software very well. That may be the reason for the lack of information in the documentation — they know it so well they assume it is clear to everyone. Maybe excerpts from large programs could be included or some of the people who already have *CBASIC* could send Cer-Comp some examples of the problems they had that turned out to be easy once a technique was understood.

Overall, I believe *CBASIC* is the most complete editor/compiler on the market for the Color Computer. Each individual will have to decide whether its price of $149 is too expensive. If some of the compilers I have seen are worth the $50-plus prices they charge, then there can be no doubt *CBASIC* is well worth its price. While there are many programs that compile and run as they were originally written, some of your programs may take some work and time to modify. Starting a program from scratch might be easier.

To take full advantage of *CBASIC*, the user needs to be familiar with BASIC, Extended BASIC and Disk BASIC, have patience, and a little knowledge of machine language sure wouldn't hurt, either.

(Cer-Comp, 5566 Ricochet Ave., Las Vegas, NV 89110, 32/64K disk $149 plus $3 S/H)

One-Liner Contest Winner. . .

Colors shows all the artifact patterns possible with `PMODE 4` and `SCREEN 1,1`. Press 'S' and the corresponding `POKE 178` value is shown.

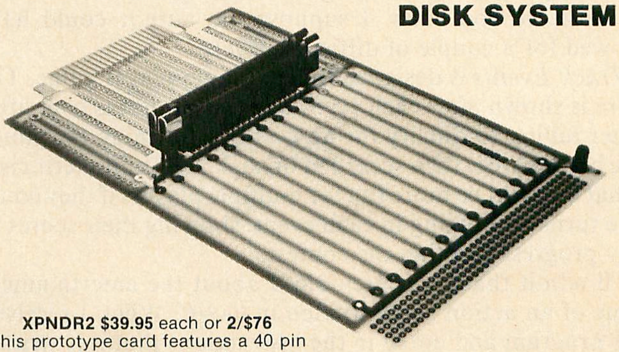
The listing:

```
1 PMODE4:PCLS1:SCREEN1,1:FORX=0T
O255:POKE178,X:LINE(199,42)-(69,
145),PSET,BF:EXEC44539:X$=INKEY$
:IFX$="S"THENCLS:PRINT"POKE 178,
"X:EXEC44539:PMODE4,1:SCREEN1,1:
NEXTELSENEXT
```

Brian Biggs
Galloway, OH

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape*.)

XPNDR2
for the CoCo
DISK SYSTEM



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Track Events Gets a High Score in All Categories

It is almost uncanny the way RAINBOW matches the review material with the reviewer. How could they possibly know that I was the captain of the high school track team when they sent me the program *Track Events* to review?

Track Events is a computer game/Simulation of several individual track events that can be played on the Color Computer. Included are the 100-yard dash, long jump, javelin, hurdles, hammer throw and high jump. If my Latin is correct, this game might be called a "hexacathalon" because there are six events. Each event is displayed in very realistic, high resolution graphics. The best part is that you control the action of the contestant by using several keyboard keys. To make the man run, you tap the 'Q' key at a rate that is almost physically exhausting. The various actions required to jump, throw and run take very precise timing and skill. This is not a "point the man with the joystick" game.

The contest begins with the 100-yard dash. You must finish with a time of 7.2 seconds or less, or you do not qualify and must start again. This gives you the practice in running that is needed for several other events. As you progress through the contest, each event must be finished in order to qualify for the next. I'll confess that the only way I saw some of the later events was by watching my kids play. I had difficulty with some of the events even after considerable practice. This is not a problem with the game. It is better for it to be challenging than boring, because it would be mastered too soon. I suppose the author could have allowed for a couple of difficulty levels.

Track Events is designed to be a single-player game. The score is shown after each event and the contest is over after either failing to qualify for an event or finishing the game. The high score is then recorded on disk. One minor criticism is that it would be more fun for multiple players if they could take turns competing in each event, showing their scores as they progress through the contest.

I'll admit that I am prejudiced about the entertainment value of an action game written in BASIC. When I received this program and noted in the instructions that it is written in BASIC, I thought I possibly had a dog on my hands. Boy, was I wrong! This program is one of the best examples of graphics animation I have ever seen created in BASIC. It took someone a long time to develop these graphics.

Overall, I give *Track Events* good marks: a perfect "10" for the excellent use of graphics, a "9.5" for being innovative and a "9.8" for being challenging. Even though you are only playing at the computer, *Track Events* can really tire you out. Keep in mind that this program is not meant for small children because of the skill level required. By the way, where do I go to try out for the next Olympic games?

(Baron Products, P.O. Box 1111, Lewisville, TX 75067, disk $22)

— Tom Szlucha

Become an Ace Pilot with *Fighter Pilot*

If you wait awhile, one of those big planes, which your guns have to be emptied into about 10 times to shoot down, will fly by. But, if you aren't careful, all those other fighters will get you! There are also those mid-range planes that have good tail-gunners — almost too good!

Fighter Pilot, from Saguaro Software, is an exciting game. If you want a challenge that will give you a sore trigger finger, stiff muscles and eye strain from trying to shoot down all those planes, this new shoot-'em-up is for you.

Fighter Pilot displays a screen of an aerial view. There is no color, but the graphics depictions of fighters, medium range attack/pursuit planes and huge flying fortresses are well-done and realistic. Since all the planes have props, this seems to be a World War II Simulation-type game.

It's not easy to get bonuses and extra planes. The first extra plane is awarded at 20,000 points, but that means you must make it through Wave I, collect bonuses for a substantial percentage of planes shot down and, hopefully, bonus points from shooting down the biggest planes. There is a good variety of bonuses available, all of which are helpful and necessary. Don't worry, you won't get bored with *Fighter Pilot*!

The scoring is easy to follow — fighters are worth 150 points, paratroopers are worth 250, medium planes are worth 1,000 and large ones, 2,500. The game has a convenient pause feature, too, for when your hand gets tired from gripping the joystick!

Another excellent feature of this game is the maneuverability of your fighter. The fighter can move halfway up the screen and right to the edges of the screen, but watch out — if you touch anything other than sky, bang! One more mission wiped out!

There are only a couple of disappointments: There are no color graphics, which is understandable given the resolution needed to view the planes. The sound effects are excellent in the title screen, but only good in the program itself, and those could have been enhanced to add realism to the game. The game has a feature that allows you to save the top 10 highest (disk version only) scores, but it doesn't display them unless you choose the option to view them. Finally, there is a selection for keyboard or joystick, and since this game is just about impossible to play without a joystick, that seems a little ridiculous. Future pilots, take my advice — don't play this game without a good joystick!

The documentation accompanying *Fighter Pilot* is excellent, thorough and easy to read. I recommend this game to anyone; it is challenging, fast-paced, exciting and, let's face it, you'll end up spending hours in front of your CoCo trying to beat that high score.

(Saguaro Software, P.O. Box 1864, Telluride, CO 81435, requires 32K, joysticks optional, tape $24.95, disk $29.95)

— Jeffrey S. Parker

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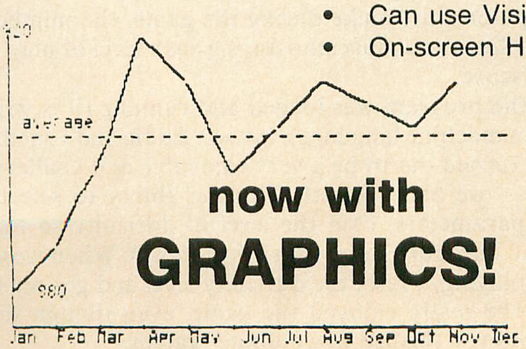

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Crossover — a Fun Game for the Whole Family

Have you ever played an arcade game that pitted you against your best friend? Or a game that, after playing it two or three times, you could play with your eyes closed? *Crossover* is a unique game from Rococo Software that solves these dilemmas.

First, even if two people play, there is only one score. The players do not attempt to compete against each other, but instead, they work together. Second, at the beginning of this program you have the option of selecting one or all of the starting parameters of play. A parameter is the upper and/or lower limits of a specified function. In *Crossover*, you have the option of setting the limits of the game in either one or all five of the following ways: 1) overall speed; 2) number of crossovers; 3) number of lines; 4) line rate; or 5) number of hits per wave.

Option one selects the overall speed of the game. A '1' is the fastest speed and a '9' is the slowest speed.

Option two selects the number of crossovers the computer will have to make. Number 10 is the least amount and number 90 is the largest amount of crossovers allowed.

Option three selects the number of lines the computer will be using to try to crossover. You can have from one to nine lines for the computer to use.

Option four selects the speed of the computer's lines. Again, a number '1' is the fastest speed, and a number '9' is the slowest speed.

Option five selects the number of lines that you must stop at each level of play. Number 10 is the least amount, and number 90 is the largest amount of lines allowed at each level.

After you have selected all of the starting parameters, you will see the following prompt : "Increasing Difficulty (Y/N)." If you choose "no," all of your starting parameters remain the same throughout the game. If you choose "yes," then the overall speed, number of computer lines, and the computer's line speed continually increase during the game.

Crossover also includes another option that I really appreciated. If during play you need to stop for some reason (nature's calling or you would like to take a break), just press the 'P' key. This causes the game to pause. When you're ready to play again, just press RETURN. If the game is getting too fast and furious for you (and believe me, with this game that is a distinct possibility), just press the BREAK key and it returns you to the title screen.

After you have selected all of the starting parameters and decided on the difficulty level, you will advance to the next screen. This screen has a row of numbers down the left side, and you will see a speeding line that travels across the top of the screen; down the right side the line points to the level you are about to start. This screen clears and you will be on the game screen. You can change the color of this screen by pressing the left joystick button. Start the game by pressing the right joystick button.

The object of the game is to stop the computer controlled lines from crossing over one side of the screen to the other. You control your lines with either the right or left joystick. If two people play, they will be playing as a team. If only one person plays, he can choose which line he would like to control.

To stop the computer's line, you need to run into the front of it with your line. But (yes, there is a catch), the computer's lines are one of two colors, and your line must be the same color as the computer's line. To change the color of your line, just press the joystick button.

The screen displays your score, the number of crossovers the computer must make during the game, the number of computer lines you must stop during each level of play, and the high score.

After the program was loaded and running (it is written entirely in machine language), my son Eddie and I sat down for what turned out to be a very enjoyable and challenging evening — we had a blast! With the ability to select the starting parameters, I set the level of difficulty so that it wasn't too hard for Eddie, who is 7 years old. When we were finished playing, I reset the difficulty level and got my wife to play; she really enjoyed the game, even though she is usually not too thrilled by computer games.

I really enjoyed *Crossover*, and recommend buying it to anyone who enjoys arcade-style games.

(Rococo Software, 3019 Sylvester Drive, Hartland, WI 53029, tape $14.95, disk $17.95)

— John H. Appel

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Electronic Motion Control Company has developed a full line of hardware to enable the use of your CoCo for all sorts of control applications, including robotics. The hardware offered consists of a variety of fully assembled and tested circuit boards ready to plug into your CoCo for specific applications.

Model 100 Parallel Port — This board provides you with 16-bit parallel control. Two eight-bit programmable registers are provided and all outputs can be programmed to specific TTL levels. This board can be plugged into the CoCo expansion port for stand-alone operation or into a multislot card such as the Model 400 Mother Board.

Model 200 Buss Driver — This board plugs into the expansion port and provides some distinct advantages:

- The buss signals provided at the CoCo expansion port are not buffered or amplified since they are wired directly to the 6809 microprocessor. If you connect multiple project cards as with a Y-cable, you may pull too much current from the microprocessor and cause damage. We have sometimes seen inductive coupling caused by the use of Y-cables that often results in erratic operation of the devices using the Y-cable. The Model 200 solves this problem by isolating and amplifying all signal voltages; if you make a mistake in your project card wiring or plug a board into the mother board incorrectly, you will not damage your CoCo.
- The Model 200 also has a built-in address decoder that recognizes only valid address codes from attached project cards, thus reducing system errors caused by incorrect address codes in your program experiment.
- The CoCo's internal power supply is fairly small and can be overloaded if too much of a load is applied to the expansion port. The Model 200 provides a connection for an external power source in those cases where several project cards are connected to the system.

Model 400 Mother Board — This is EMC's version of a multislot card. It's made to connect either to the expansion port by using EMC's No. 1000 connector or to the Model 200 Buss Driver. Either way it provides four slots for the user, but as explained above, the Model 200 Buss Driver is recommended to prevent overloading the microprocessor. One other option provided is a way to link up two or even three mother boards together to create an eight- or 12-slot system.

Model 500 Motor Driver Amplifier — This board drives DC motors or solonoids up to 0.5 amps at 12VDC. The inputs accept TTL level from the Model 100 Parallel Port. Each amplifier requires two data lines for control, so as many as eight Model 500s can run off of one parallel port. Speed control is also provided. With these boards and a little imagination, a pretty sophisticated robot could be built.

All of the circuit boards are top-quality glass-epoxy with gold-plated contacts at circuit edge connections. The electronic components are also top grade. Documentation is adequate and very technically oriented; you must have some technical knowledge to sucessfully use these products. Don't expect to build a robot if you don't know much about electronics. If you're not a real "hardware hacker," this package may not be for you.

I would like to see EMC offer some sort of cabinet or box to house these various boards. I realize that in most cases the builder would create a variety of applications all requiring "custom" enclosures, but for the sake of neatness and safe operation, enclosures would be desirable.

Service for all these boards is available, if needed, at about $25 with a two-week turnaround. The prices for the various boards are listed below and, in my opinion, are very reasonable.

(Electronic Motion Control, P.O. Box 27271, ARPT Station, Clearwater, FL 33516, Model 100 Parallel Port $39.95, Model 200 Buss Driver $89.95, Model 400 Mother Board $44.95, Model 500 Motor Control Amplifier $29.95 plus $3 S/H or free shipping with money orders)

— David Gerald

Hint . . .

Printer Baud Rate POKEs

On Color Computers having the newer Color BASIC 1.2 or 1.3 ROMs, the default Baud rate POKE (in location 150) for 600 Baud is 88 instead of 87. As far as I know there is no real difference between the two, and the POKEs for other Baud rates are the same on all CoCos.

— Ed Ellers

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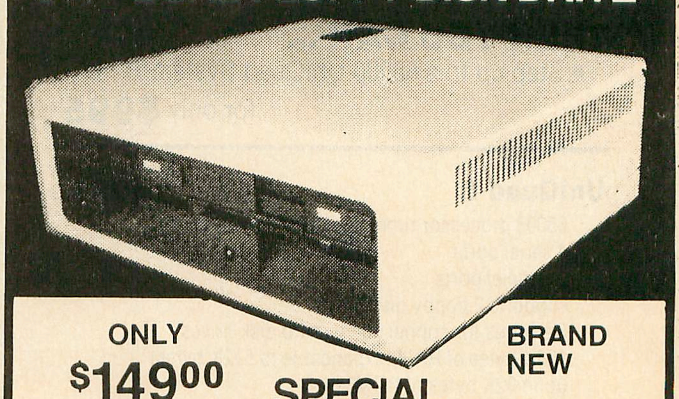

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Start Garden Planning Early with *CoCo Gardener*

I love to grow things. We moved from the city to 33 acres in the country in order to have more room for our garden. Gardening is one of the few things that can tear me away from the computer and vice versa. Receiving *CoCo Gardener* gave me a chance to exercise both of my favorite avocations.

CoCo Gardener is basically a garden planner and shopping list generator. The program also supplies information on various vegetables' propagation requirements. Use of a printer enables the user to take advantage of one of the nicer features of the program (i.e., the seed shopping list that is compiled by the program from user input in other program sections).

The program is completely menu driven. The menu gives six choices: 1) Crop information on the screen; 2) Crop information sent to the printer; 3) Garden planning; 4) Crop planting guide (information obtained from Selection three); 5) Print shopping list (information obtained from Selection four); and 6) Exit the program.

Selection one first asks for a row size. It then asks if you are interested in a listing of several vegetables. If you answer "yes," information on a vegetable is displayed on the screen, including amount needed per row, inches between plants, inches between rows, yield per row, days to maturity and amount needed per person for both fresh and frozen.

Selection two is almost the same as selection one except the information can be sent to the printer in chart form instead of just appearing on the screen.

Selection three asks for garden length and width. It then asks how many rows or decimal portions of a row of each vegetable you would like to plant. As these values are entered, a black bar is gradually replaced with white. When the black bar is totally white the proposed garden is filled.

Selection four relies on the information from Selection three, which is used to create a planting guide sent to the printer. This planting guide is a chart that gives the order in which to plant, starting from the north end and proceeding to the south with the rows running from east to west. Each row is marked with which vegetable to plant and how many rows you have allocated.

Selection five prints out a seed and plant shopping list. It gets its information from Selection three and includes the name of the vegetable, amount required and a blank for the variety.

The program is supplied on a cassette and includes one page of documentation describing the bare bones of each section. When I put the cassette in the machine I didn't know whether to `CLOAD` the program or to `CLOADM` it. This wasn't really too important as I also didn't know the name of the program. Neither piece of information is in the documentation. I used the `SKIPF"x"` technique to discover the name GARDENER. I then `CLOAD`ed it and it ran with no problems.

Selection one worked as expected and really gives useful information on planting each vegetable. Selection two also ran without a hitch and printed its information in a neatly formatted chart.

Selection three had several problems. The black bar, which is supposed to represent how much garden you have left, is difficult to interpret. It is very hard to get an accurate picture of the remaining space. To make matters worse, the program does not prompt when the space is used up, but forces you to continue allocating space that is not there. A much better idea is to have two numbers on the top of the screen. One would be the total number of row feet that are allocated and the other would be the total number of row feet remaining. The program should stop when all space in the planned garden is allocated and then, if there are vegetables that are selected and not planted, the program should ask you if you want to change any of the amounts. Both of these changes would be fairly easy to implement and require little extra memory.

Selection four had several problems, also. The printed garden plot gives vegetables in rows; unfortunately, there are no indications of the spacings between these rows, nor are there any clues as to how many plants per row and their spacing within the row. The program obviously intends the spacing to be varied in the garden as the printed plan varies the spacing on its printed rows. However, no indication of how much spacing is recommended is printed on the form. These problems require going back to the information from previous program sections and scribbling in the relevant information on the printout.

An additional problem stems from using fractions of rows as the program suggests. The printed plot gave each of these fractions a complete row of space in spite of the fact that they were only one-tenth of a row long. These problems left me feeling that the garden plot was not very useful in its present form. I'm sure a little work on this section would make it the nicest part of the program.

Selection five worked well and, from my own computations, quite accurately in computing the required amounts of seed or plants necessary to buy. The shopping list was neatly done and should prove very useful.

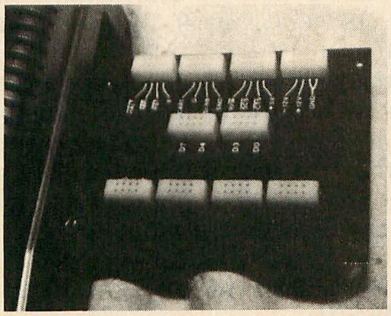
One other problem I noticed is there are no form feeds after each printout. This results in the three forms running together. This could be remedied easily by adding a `PRINT#-2,CHR$(12)` (form feed) after each printing action.

I have mixed feelings about the *CoCo Gardener.* As a computer user and gardener I would like to support the programming efforts of others to combine the two however, even though the program offers some very good features, I feel there is too much work needed to recommend it. The concept of the program is good; I really hope the authors will do some revisions and re-release it. With the necessary changes, it should make a nice addition to a gardener's software library.

(Tothian Software, Box 663, Rimersburg, PA 16248, 16K ECB, printer optional, cassette $19.95)

— Larry Goldwasser

Monitor and control events with your CoCo



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OS-9 Calligrapher is Both Elegant and Powerful

Several high quality programs have made the leap from Radio Shack BASIC up to OS-9. Sugar Software's calligraphy program is one of them. *OS-9 Calligrapher* is big brother to *CoCo Calligrapher* (reviewed in the October 1985 RAINBOW, Page 215). It has all of the beauty of its little brother and a great deal more power.

OS-9 Calligrapher is distributed on a Radio Shack OS-9 formatted diskette and requires a 64K Color Computer, at least one disk drive, OS-9 Level 1 Version 1.01.00 or later, and a dot-matrix printer capable of bit-image printing. A working knowledge of the OS-9 operating sytem is also needed since *OS-9 Calligrapher* is not an interactive program, but merely a filter. In general, a filter reads input, does something to it and writes output. *OS-9 Calligrapher* is not as simple or easy to learn as *CoCo Calligrapher* is.

Like the Disk BASIC version, *OS-9 Calligrapher* is distributed with three print fonts on the diskette. These are Old English, Gay Nineties and Cartoon (see Sugar Software's ad in THE RAINBOW for a sample of each font). There is also a variety of other fonts available from Sugar Software.

Unlike *CoCo Calligrapher*, with *OS-9 Calligrapher* you can control every aspect of printing. You control print font, page width, page length, page break, indentation, justification, centering, vertical tab, line fill, top margin, bottom margin, print density and the output path. The printer Baud rate is dependant upon OS-9's printer Baud rate. You must read the directions very carefully. Since *OS-9 Calligrapher* is so powerful, it does tend to be a little complex.

OS-9 Calligrapher allows you to use multiple fonts in the same output. Using a combination of fonts allows you to create some very impressive printouts. This is a feature that *CoCo Calligrapher* does not have.

You may use any text editor to create files for *OS-9 Calligrapher.* However, you must use lowercase letters when specifying directives. You can activate lowercase letters in OS-9 by using the tmode -upc command along with CLEAR 0 (zero). If uppercase is used in a directive line, an error occurs. You can also create disk files to be printed later using *OS-9 Calligrapher.*

The program comes configured for an Epson or equivalent printer. Five other printer set-up files are included on the diskette. These are for the Gorilla Banana, Radio Shack LP and DMP series, Gemini-10 (different from the 10X), Okidata and Prowriter printers. If you own a different brand, instructions are included for writing a customized version for your particular printer. This is not too difficult. Most of the necessary data comes straight from your printer manual.

The 20-page instruction manual is complete and precise. Several examples are included to help clarify the commands and syntax. A label-printing example demonstrates the power and flexibility of *OS-9 Calligrapher.* This is informative as well as very useful.

I highly recommend this program. It is an excellent utility and it worked flawlessly. Because of its flexibility and power, *OS-9 Calligrapher* tends to be a little complicated, but if you carefully read the instructions and use the examples, you will have no problem. If you want the most muscle and capability, buy *OS-9 Calligrapher*!

(Sugar Software, 1710 North 50th Avenue, Hollywood, FL 33021, $39.95 plus $1.50 S/H)

— John R. Curl

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Moneyopoly: An Old-Time Favorite Comes to the CoCo

Moneyopoly is a rather thinly veiled name for a CoCo version of the time-proven game of "Monopoly." Although we are always warned to "never assume," I feel safe in assuming that you, the reader, have at least a basic understanding of "Monopoly" and, therefore, I will not go into the details of how the game is played.

In *Moneyopoly*, the CoCo, through the use of some very well-done `PMODE 3` graphics, displays the game board. Communication with the game is handled by scrolling text in the center of the playing area. The game begins by entering the names of two to four players in the order in which they will be playing. You then determine how the game will end — three choices are available: time limit based on the number of rolls of the dice (up to 64,000 rolls); cash goal based on some predetermined level of cash attained; or one player gaining control of the entire board.

You must next decide whether the money from fines, taxes, etc., goes to the bank or under "Free Parking." If Free Parking is selected, you must indicate whether it is re-seeded with $500 or left at zero after it is won. The next question is whether the income tax (fourth box after "GO") is paid at $200 or 10 percent. Players must then decide whether they will be allowed to borrow money from the bank. Finally, you must enter whether one or two joysticks will be used. At this point play begins.

CoCo acts as the banker, each player's personal accountant and generally controls the play of the game. This is done by presenting menus of possible options at each point of play. The game is played using the left joystick. Pressing the firebutton rolls the dice, while moving the joystick and pressing the firebutton selects the menu options.

One-Liner Contest Winner. . .

This one-liner is a very useful machine language routine that subtracts 64 from the ASCII value of each character on the screen, in effect reversing the screen. This is done whenever a `Z=USR0(0)` is executed. The characters can be restored to normal with the command `Z=USR0(255)`.

The listing:

```
10 DEFUSR0=32400:CLEAR200,32400:
DATA52,32,189,179,237,193,255,39
,16,142,4,0,166,132,128,64,167,1
28,140,6,0,39,18,32,243,142,4,0,
166,132,139,64,167,128,140,6,0,3
9,2,32,243,53,32,57,255:FORX=324
00TO32400+44:READ Y:POKEX,Y:NEXT
X
```

Mike Wright
Gardiner, ME

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

When the dice are rolled, the player advances the number of spaces automatically. If the property landed on is not owned, the option to buy is presented. The auctioning option in the original game is not available in *Moneyopoly.* If the property is owned, rent is collected and paid to the owner. Owned properties are indicated on the board by displaying the owner's initials on the property. Chance, Community Chest, etc., are also handled automatically. The location and cash status of the players is constantly displayed in two to four lines at the top of the inside of the playing board.

The game handles purchase and trading of property, buying and selling of houses and hotels, and the mortgaging of property. Using the computer as a controller of a board game such as "Monopoly" has some advantages in speeding up the play of the game and, of course, provides greater accuracy in the handling of finances. There are also some cute touches in the computer graphics, for example, the waterworks has a constantly dripping faucet.

Are there any disadvantages to playing "Monopoly" this way? I must say "yes." Some of these could be overcome by additions to the documentation. Documentation is well-done and adequate for using this as a piece of software. However, because of space and resolution limitations, there are some things missing from the game board that could by compensated for in the documentation. In the four colors of `PMODE 3` it is impossible to accurately depict the colors of all the properties. In addition, the names of the properties are not shown on the board — the text tells you that you have, for example, landed on Park Place and your status line entry shows Park Place. It would be helpful to have a small picture of the board with the properties labeled.

Another shortcoming comes when it is necessary to mortgage property — there is no way for a player to scan his properties to determine their mortgage values. Instead, you select a property to be mortgaged and the game tells you its mortgage value. A listing in the documentation of each piece of property and its value would be helpful here.

Finally, there is no indication on the board itself of where each player is — the status line shows each player's location but, unless you know the board by heart, it doesn't help much. There is an option called "Where is everybody?" that flashes each name on the status line and the square on which that player is sitting. Since there are four colors available and a maximum of four players allowed, it seems the location of each player could be shown by some small symbol on the square. One other change would be to give each player the option of $200 or 10 percent on income tax at the time a player lands on it, rather than at the start of the game.

I recommend *Moneyopoly* for the avid "Monopoly" player; it does a great job as banker and generally enables the game to proceed more smoothly. To the authors of *Moneyopoly*, I recommend adding two items to the documentation; a picture of the game board with the property names superimposed, and a listing of all properties with their prices, rents, cost of houses and mortgage values.

(Novasoft, 4285 Bradford N.E., Grand Rapids, MI 49506, requires 32K and joystick, tape $19.95, disk $22.95)

— James G. Kriz

Adventure Graphics to Go with *PIXGEN*

By Eric W. Tilenius

PIXGEN is a graphics utility by Scott A. Cabit, author of the popular graphics Adventures *Syzygy* and *The Martian Crypt*. It is designed to let anyone easily draw pictures, which can then be stored in a compact form in memory and recreated on the screen in a couple of seconds. It is a program with many fantastic features and many limitations. Spectacular Software is marketing *PIXGEN* as "an Adventure Graphics Generator," and its intended use is for developing graphics for Adventures. It is not, however, an Adventure generator — you'll still have to program your own Adventure — and it does not provide any routines for putting text on the screen.

One particular advantage of *PIXGEN* is that it does not store the whole screen in memory. Rather, it stores only the commands for re-creating the picture. Because of this the average screen takes up only about 500 bytes, thus allowing the development of "memory contained" Adventures, such as those by Mark Data. Surprisingly, this advantage is also a limitation since you can only use the commands built in to *PIXGEN* to draw a picture. *PIXGEN* does not allow picture input with a digitizer, touch up with a "pixel blaster," or use of pre-drawn images from anywhere else in your program. Thus, it is very important to know ahead of time the purpose of *PIXGEN*'s tools.

The three main tools are the LINE, CIRCLE and PAINT commands. Since the program's main function is Adventure graphics, all three commands are limited in area to the top half of the screen, leaving room on the bottom half for text. In addition to these drawing tools, options are provided for viewing all pictures in memory, killing a picture, overlaying pictures and displaying the present program conditions (free memory, the position of the cursor on the screen and the number of pictures in memory). A handy menu of these commands is available at any time by pressing 'M'. All commands are entered via the keyboard, while all graphics movement is controlled by a joystick or mouse.

The LINE command is fairly straightforward. You can select what color in which to draw the line and even use a "mixed" color by entering a number from zero to 255. On the whole, I found the red, blue, black and white worked best. After that, drawing a line is as simple as positioning your cursor where you want the line to start, tapping the firebutton, moving the flashing cursor to the end of the line and pressing the joystick button again. Voila! The line appears on the screen. Cursor movement is fairly smooth, although exact positioning with a joystick may be a little tricky.

The CIRCLE command works well, but it is limited in that it cannot do ellipses or arcs. Again, you have a choice of 256 colors, plus you can choose a pixel width of one or two: A width of one produces a fine, detailed circle, while a width of two produces a thicker loop. Creating circles is just as easy as drawing lines. Simply "position and press" for the center of the circle, then move away and press the button at the desired radius length. The drawing speed for a circle is rapid — usually less than half a second for an average-size circle. Unlike Extended BASIC, the parts of a circle that go off the screen are not drawn as straight edges along the border of the screen. This lets you create some interesting effects, and even produce an arc (with a bit of trial and error). Speaking of trial and error, an UNDO command erases your last action if you wish.

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

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COMMANDS SUPPORTED

```
1. I/O -Commands
    CLOSE    CLOADM   CSAVEM   DIR       DRIVE    DSKI$
    DSKO$    FIELD    FILES    GET       INPUT    KILL
    LSET     OPEN     PRINT    PUT       RSET

2. Program Control Commands
    CALL     END      EXEC     FOR       STEP     NEXT
    GOSUB    GOTO     IF       THEN      ELSE     ERROR
    ON..GO   RETURN   STOP     SUBROUTINE

3. Math Functions
    ABS      ASC      ATN      COS       CVN      EOF
    EXP      FIX      INSTR    INT       LEN      LOG
    LOC      LOF      PEEK     POINT     PPOINT   RND
    SGN      SIN      SQR      TAN       TIMER    VAL

4. String Functions
    CHR$     INKEY$   LEFT$    MID$      MKN$     RIGHT$
    STR$     STRING$

5. Graphic/Sound Commands
    COLOR    CLS      CIRCLE   DRAW      LINE     PAINT
    PCLEAR   PCLS     PLAY     PMODE     PRESET   PSET
    RESET    SCREEN   SET      SOUND

6. Other/Special Commands
    DATA     DIM      LLIST    MOTOR     POKE     READ
    REM      RESTORE  RUN      TAB       VERIFY   DLD
    DST      IBSHFT   LREG     PCOPY     PMODD    PTV
    REAL     SREG     SWP      VECTD     VECTI
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One-Liner Contest Winner. . .

This one-liner sounds the Morse code for any letter key pressed. Wait until each character is complete before pressing the next key.

The listing:

```
1 Y$="?ETIANMSURWDKGOHVF?L?PJBXC
YZQ":X$=INKEY$:IFX$=""THEN1ELSE:
X=2*INSTR(1,Y$,X$):X$="":FORC=1T
O5:X=INT(X/2):X$=X$+CHR$(X+70):N
EXT:X=INSTR(1,X$,"G"):X$=LEFT$(X
$,X-1):FORC=LEN(X$)TO1STEP-1:G=A
SC(MID$(X$,C,1)):SOUND200,((G/2-
INT(G/2))*4+1)*2:NEXT:RUN
```

Keith Stamps
Prentiss, MS

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape*.)

The PAINT feature is where *PIXGEN* really shines. Two painting modes are available, Ultra paint and Textured paint. The two are similar, with the exception that Ultra paint is slightly faster and paints until it hits either a solid black or white line, but won't go around corners (it just goes straight up and down, spreading out sideways until it hits any border). The Textured paint asks you to specify a border color and can get in tight corners better. The PAINT option allows you to specify two numbers, each from zero to 255, for the odd/even bit color codes. This means that over 32,000 color/texture combinations are possible!

One other important feature is the OVERLAY option. It allows you to take a picture previously drawn in memory and overlay new items on it (an additional object, color, etc.) without taking up memory for a whole new picture.

All of the functions are a breeze to use. This is partly due to the fact that there isn't all that much to use. Essentially, you have to create pictures using only dots, lines and circles. To someone who's used the full graphics capability of *CoCo Max*, for example, this may take a little getting used to. Though I'm not much of an artist, I was able to get some halfway decent pictures drawn without too much hassle.

The program's one shortcoming is that there is no way of editing commands already entered. If, for instance, you've created a brilliant drawing only to see that a line is slightly off, there is absolutely no way to move it. An editing feature would improve *PIXGEN* immensely.

After you have finished a set of pictures, they can be saved and compiled with an included compiler program. Once compiled, this "picture file" can be loaded into memory from BASIC. Selecting which picture appears on the screen is as simple as a `POKE` and an `EXEC` statement. The compiled file is saved in machine code. *PIXGEN* re-creates pictures quickly — a detailed picture takes less than three seconds, and a less detailed one can be drawn in under a second.

The documentation is well-written, and the program's simplicity makes it almost unnecessary to consult it after reading it once.

When it comes to error handling, though, *PIXGEN* leaves a lot to be desired. Once, when drawing a line, I hit the joystick button twice in the lower right-hand corner of the screen only to be greeted with a crash back to BASIC and a friendly "?FC ERROR IN 106" message. Also, if the Texture paint function is not carefully bounded, it spreads off the screen and ravages about in memory. The program crashed once on me that way, too.

Overall, I give *PIXGEN* the following ratings (1=poor, 3=average, 5=excellent): price vs. value, 3; documentation, 4; performance, 3; ease of use, 5; error handling, 1; and speed, 4. I recommend *PIXGEN* to anyone interested in writing graphics Adventures where storing pictures on the disk is not a valid option. I think you will find *PIXGEN* a powerful tool, provided you can live within its limitations.

A suggestion to make the program better would be to provide editing features and more drawing tools. Also, a "text on the graphics screen" routine would be a nice touch. As it is, though, its speed and memory conservation make it worthy of consideration.

One interesting note: Spectacular Software gives purchasers of *PIXGEN* the right to market graphics Adventures created with it, provided they approve the final product. If approved, they will let you use the compiled *PIXGEN* pictures without any royalty fees.

(Spectacular Software, P.O. Box 363, Mansfield Center, CT 06250, requires 64K, tape $27.95, disk $29.95 plus $2 S/H)

One-Liner Contest Winner. . .

Mini-life is a "linear" game of "Life." The program displays the "Life" colonies on the `PMODE 4` Hi-Res screen. After filling the screen, the program waits for a key press before ending.

The listing:

```
0 Y=RND(-TIMER):PMODE4,1:SCREEN1
,1:PCLS:FORI=1TO9:PSET(RND(254),
2,1):NEXT:FORY=2TO190:FORX=1TO25
4:C=0:G=1:FORI=0TO2:C=PPOINT(X+1
-I,Y)ORC:G=PPOINT(X,Y-I)ANDG:NEX
T:P=(NOT(PPOINT(X-1,Y)ANDPPOINT(
X+1,Y))ANDC)ANDNOTG:PSET(X,Y+1,P
):NEXTX,Y:EXEC44539
```

Pete Hays
Newark, OH

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

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CoCo Solver and *Program Generator* is a Powerful, Useful Package

By Donald M. McGarry

CoCo Solver and *Program Generator* is a truly interesting, well-done and powerful package. The author has created a program that does some nearly impossible tasks, such as adding lines to a running BASIC program — a neat trick. Also, there are uses for this program for people of all levels of expertise. The non-programming beginner can use it to do useful calculations without learning a lot of programming, and the experienced programmer can make the package do some complex and powerful jobs with relative ease. Finally, the package is well-conceived, well-presented for the most part and fairly simple to use.

The version I reviewed came on disk with a printed manual, notes for disk users and some printed sample programs from *The CoCo Solver Newsletter.* The disk is not copy protected. There are also a number of sample templates on the distribution disk. These illustrate different facets of the program. The samples are really needed since the author has avoided describing what the program is used for in the manual. In all fairness, I found it difficult, too.

CoCo Solver could be compared to a small number of cells in a spreadsheet. Each cell can be named according to Color BASIC variable naming rules. There is also room for a 10-character comment, which is displayed on the screen. Each variable can either be assigned a value or be defined in terms of other variables and constants. There is room on each "page" of the display for up to eight variables. Once all variables are entered and assigned values or defined, a single keypress "loads" this information into the program and the page can be "run." Whatever calculations were defined are completed and the results are displayed. After running the template, new values can be assigned to variables and the template can be run again.

Using this simple mode of operation you can set up some interesting calculation procedures. This is also the level where *CoCo Solver* most resembles a spreadsheet. Once a problem is entered, many "what if" type calculations can be tried. A good example is a simple template I ran to calculate payments on a car loan given the amount financed, interest rate and length of the loan. It took only a few keystrokes to try different combinations of input to see the effects on the size of the monthly payment.

If *CoCo Solver* could do no more than this, I would recommend it as a handy tool for nearly anyone. It is quick and simple to define a problem, then try different variations of the input values. The program can do much more, however. One of the options is "vary." It allows you to vary the value of one of the input variables over a range using your own step size, and send output to the screen or printer. This is convenient for printing tabular information quickly.

I should emphasize the speed of setup because that is what makes the program handy for a lot of small jobs, especially to someone who is comfortable with programming. Running *CoCo Solver* to find the effect of interest rate on loan payment size is much quicker than writing even a short BASIC program to do the same thing. I use the program often to do things that would otherwise take more time — even if writing a simple program would do the same thing.

I still haven't delved deeply into the capabilities of *CoCo Solver.* The author has thoughtfully provided a list of program variables and their uses, and has shown how to manipulate them to do some really powerful things. The program is absolutely terrific at producing tables of calculated values such as mortgage amortization tables. The generated program lines are numbered consistently, so that with some knowledge of programming and a little work you can build elaborate mathematical models.

In fact, although the program lends itself to mathematical calculations as well as table generation, nearly any BASIC program statements can be included in a definition. This means if you can do it using BASIC, you can probably do it from within *CoCo Solver.* If for some reason you can't accomplish what you want to do from within the program, you can always write a subroutine and add it to the program. The possibilities are almost endless. Of course, for the advanced applications a good knowledge of BASIC programming is needed.

I certainly was not able to try every possibility that *CoCo Solver* allows, but I think it is fair to say that it would be a long time before even a skilled programmer would outgrow the program. It takes awhile to get used to the style of the program and the environment. During that time you might be tempted to quit and write a separate program to do the job, but there is value in sticking to it. The more you get to know the program, the more possibilities seem to open up.

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The most use could be made of *CoCo Solver* by someone who begins using it early on as one of his or her first programs. Then, as the user's confidence and programming ability grows, his or her understanding of and insight into the program would also grow. *CoCo Solver* can help someone build programming skill while offering an immediate method of doing useful work.

There is still one more capability. The package I received for review included *Program Generator.* This program has the ability to take a working model and turn it into a program. If no one else ever uses one of your models, I don't see any great value in this option. You have to run the generated program from the main menu in order to have a machine language support program properly loaded.

The real value to me is in the generated program's permanence. A user cannot change definitions, for example. I teach high school physics and have put generated programs to some trial use in my classroom. Laboratory calculations can be defined and tested, and then a program generated using *Program Generator.* Students using the program can calculate results, change input values and recalculate, etc. However, they cannot change the model. (That would hurt those who had to use the program later.) The generated programs offer a consistent user input method, also. This means once the program is mastered, all other generated programs will be easy for students to use.

CoCo Solver is not without its problems. One of the major drawbacks is the manual. It is clearly written, but doesn't describe some rather important points. For example, when the menu program is run from BASIC, there are two choices for *CoCo Solver.* Nowhere in the manual is there a description of the differences between these programs.

I also found it difficult to determine the exact method to do some things that the program is obviously capable of doing. A little experimentation and a peek at the examples on the disk were all that was needed to point me in the right direction, but a clearer manual would have helped. As I mentioned earlier, the manual gives no clear description of the major reasons for the program's existence. After some practice with both programs, I can understand that problem — any description would be incomplete or would sound impossible. Still, I wish they had tried.

The only other complaints are due more to the limitations of the computer than the program. The display is really too small. It would be nice to be able to see definitions entered and to have long comments. The 16 by 32 screen format eliminates either of these possibilities. Finally, BASIC does not have error-trapping functions, and *CoCo Solver* relies on the user to deal with errors. If the program halts on an error, the user must type `GOTO 1150` to restart without losing all previously entered information. This method works, but it seems inelegant. It should be possible to add error trapping and translation to the program. I hope the author considers doing so in a future release.

Overall, I was impressed with *CoCo Solver* and *Program Generator.* At first, I was unsure it was worth very much at all. But after using it for a while and working around the manual, I find it a valuable as well as useful package.

(JTJ Enterprises, P.O. Box 110841, Nashville, TN 37211, requires 32K ECB, cassette or disk $49.95 plus $2 S/H)

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The Best of Both Worlds with DOS Switcher

One of the nicer features of our friendly CoCo is that the Disk Operating System resides in a ROM chip located inside the disk controller. Many computers require that you "boot up" with a DOS disk before you can do anything else. The DOS being in ROM means that as soon as we turn on our CoCo, it's ready to go to work for us . . . no muss, no fuss. If you stop and think about it, this plug-in IC chip can be used to our advantage. For those using the J&M Disk Controller, it's even easier to make use of this feature.

But, how many times have you found that your JDOS will not work with certain programs? How many times have you wished you could go back to Disk BASIC "just temporarily"? Now you can do just that! The Spectrum DOS Switcher is a very small, compact printed circuit board with two DOS sockets and a three-position switch attached. The board measures 1½ by 2 inches and simply plugs into the socket on your J&M Controller that your current DOS chip occupies. The instructions with the switcher are easy to understand, so even a novice should be able to hook it up.

The switch can be mounted to any convenient place on the controller, however, this requires drilling a ¼-inch hole in the case. In order to be able to switch between DOSs, you obviously need two DOS chips. If all you have is JDOS, then you will need to purchase another DOS chip or burn your own on an EPROM, but if you have your old Disk BASIC chip stored away all you have to do is plug it into the other DOS socket. After that, it's just a matter of deciding which DOS you want to use and setting the switch to that position. The switch supplied is a three-position toggle type with the center as off. The center position disconnects both DOSs so you end up with Extended BASIC only.

Even though this switcher is advertised for the J&M controller only, Disk BASIC users with the Radio Shack controller need not despair! I soldered a socket to a small piece of vector board, hooked up a few inches of 24-conductor ribbon cable and put the whole thing in a small plastic box that can be stuck to either the top or bottom of the disk controller with a couple of pieces of double-sided tape.

One other feature worth mentioning is that one of the sockets on this switcher is a 28-pin, while the other is a 24-pin. This is a handy feature that enables use of the larger 128K chips if you're into burning your own EPROM. Otherwise, just plug in two 24-pin chips per the instructions for two-DOS operation.

If you've been looking for a way to have the best of both worlds, the Spectrum DOS Switcher may be just what you need.

(Spectrum Projects, Inc., P.O.Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $24.95 plus $3 S/H)

— David Gerald

XPNDR2 and Super Guide — an Ideal Expansion Card Set

The diversity and number of expansion boards available for the CoCo never ceases to amaze me. Robotic Microsystems plays a major role in this area with their XPNDR2 plug-in expansion card. This card measures 7 by 4¼ inches and provides traces connected to the CoCo 6809 microprocessor via the game or "expansion port," as I prefer to call it. The board is very well-made and features gold-plated edge connectors and plated through holes.

A nice addition is a red LED mounted at one corner of the board to remind you that CoCo is turned on. It's also a reminder not to unplug the board with the power turned on.

Attached to about the center of the card is a sturdy 40-pin edge connector socket suitable to plug in your disk controller, voice pack or any other applicable cartridge. The controller or cartridge sits vertically, leaving space on either side of the connector available for experimental circuits. The 40-pin socket is mounted with wire-wrap pins so easy connection can be made for experimenting. In fact, the board is designed to accommodate wire-wrap sockets for ease of experimenting. A full 24 square inches of component layout space is also available.

Documentation is complete and detailed. A well-illustrated booklet titled "Application Notes" is included. This eight-page booklet is geared toward the experimenter and especially the beginner with its light touch of technical subject matter associated with microcomputer interfacing techniques.

Another item included in the package is called Super Guide. This little plastic gadget mounts inside the expansion port and contains a slot that serves to add support to the XPNDR2 card. This is a very helpful accessory to any expansion card and is recommended since it prevents stress and strain on the expansion connector. It also holds the flap door open and its thin slot (⅛ inch) prevents accidental contact with the connector. It does a great job in accomplishing all these tasks and it's not expensive!

If you're into interfacing, you need to look at what Robotic Microsystems has to offer.

(Robotic Microsystems, Box 30807, Seattle, WA 98103, Super Guide $3.95, XPNDR2 $39.95)

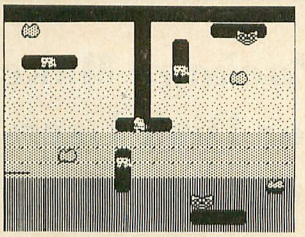
— Jerry Semones

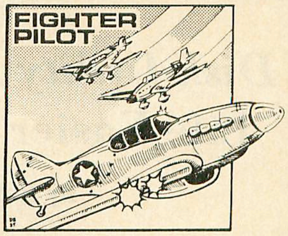
Hint . . .

The Most Memory

By typing `POKE 27,0:CLEAR0:RUN` (on a non-disk system), you get the highest `MEM` value possible on a CoCo system. This is 16367 for a 16K system and 32751 on a 32K system.

A Susquehanna Reader





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A fantasy graphics adventure. You are Garotte Severinn, master thief, spy, and assassin. Your mission is to kill the evil wizard Neeman, recover the holy scepter of Tash, and escape from Neeman's castle. The reward is a fortune in gold, but beware...many dragons and monsters stand between you and the gold! 32K, one disk drive required.

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Disk Utility Package Makes Life Easier for Disk Users

By Robert E. Foiles

Bob van der Poel opens his manual with "Thank you for purchasing *Disk Utility Package*." At this point I disagree with Mr. van der Poel — the purchaser should be saying "thank you" to him for putting together the *Disk Utility Package*! I feel it is always nice to say "thank you," but I feel even better when a program comes to market and it does what it is supposed to do without problems. I am also pleased that he provided his programs unprotected, allowing the user to make a backup copy to use on a day-to-day basis.

Disk Utility Package is really 11 utility programs designed for 35-track or 40-track disk system users. The 11 programs include *ARCHIVE, BACKUP, COMPARE, FIND, FORMAT, MENU* and *OCCOUNT.*

The *ARCHIVE* program is designed to make a backup copy on tape of the disk in Drive zero. "Routine," you might be tempted to say, but wait, there is more! The program lights up the screen in a colorful graphics display of the word "archive," and on the bottom half it displays all the other instructions and a running description of what the program is doing. This program is designed to work faster than some other backup utilities because it backs up only those tracks that have data recorded. The design includes provisions to do backups from regular Disk BASIC or OS-9 material from either 35- or 40-track disks. Users need only change two lines of the BASIC driver program to accommodate their system. The manual details the required changes and should not be a problem for even the most inexperienced user.

In either of the formats, the program saves a copy of itself to the tape first. This, of course, allows the user to just CLOAD and RUN to restore a disk from the tape. The program handled backups of a disk that had no free space and another disk that had just one short machine language routine on it. In both cases, the programs ran without error after restoring the material to a new disk from the tape.

The *BACKUP* utility is really four versions from which to choose. The choices include a version for the user with 35- (standard Radio Shack model) or 40-track disk systems and those systems with either 32K or 64K. Loading the proper configuration puts the proper machine language program into memory and automatically starts it for the user. The program works with a single drive or up to four drives.

The nice touch with this program is that the user is given a running account on the screen of what the program is doing. Needless to say, the machine language program(s) is fast. How fast? Single drive, with 64K, required only three disk swaps. If the program encounters a "bad" sector, the error-trapping section displays on the screen the sector number giving trouble, and asks the user if the sector should be skipped, try again or quit (which ends the program).

In keeping with the package's versatility, *FORMAT* gives the user two versions to choose from to match either a 35- or 40-track disk system. This section performs the same operation as DSKINI, but it does it a couple of seconds faster per disk and provides the necessary procedure to format as many disks as the user might wish just by putting the next disk into the drive (either 0, 1, 2 or 3) and entering the drive number. So fast and so simple, and the user does not have to be concerned about the "bug" in the earlier versions of DSKINI routine. While the program is working, the user is given a screen display of what is actually being done.

The *FIND, COMPARE* and *OCCOUNT* programs may at first glance seem like a few "bells and whistles" to round out the disk — not so! These three utilities can be true "workhorses" for the user. *COMPARE* reads a program on the same disk or on another drive and tests the second program against the first program, byte by byte. Again, the screen display gives the user a running account of what is being done by the program. However, you have to be on your toes since the program is so fast that the job is done before you realize it. That is, of course, in those cases where there are no errors in the match. If a mismatch is encountered, the readout stops and the program advises the user. The author has provided the more experienced user an opportunity to modify the BASIC driver for this machine language routine for individual use.

OCCOUNT stands for "occurrence count" and is designed to read a disk file and count the number of times a specified string appears. The disk file may be either a text file, a machine language program or a BASIC program. The use of the up-arrow key is considered by the program as a "wild card" in moving through a file. One note of caution: A BASIC program must have been saved in ASCII to be usable by this utility. It is not a fault of the program, however, since the regular SAVE command saves reserved words in token form. Therefore, asking the utility to count

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by CHERRYSoft

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the number of GOSUBs in a BASIC program that is not saved in ASCII produces a zero. The utility allows the user to specify the search string to be treated as all uppercase or as upper- and lowercase.

The *FIND* utility, as the name implies, finds and prints to screen any lines containing a specified search string. The up-arrow key is also a "wild card" character in this utility, and the option of treating the material as all uppercase or both upper- and lowercase is part of the program. This utility reads an ASCII file and locates the specified string wherever it might be located within the line (or within a block of 500 characters not interrupted by a carriage return). It worked with three different database data files and found each time the specified search string and displayed on the screen the line of text in which it was found. Tapping the space bar moves the search on to the next location.

As with such search programs, the search reports the finding of the sequence even if the letters are part of another word. For example, the search string used in one test was "disk" and the utility found "diskedit," "copydisk," "diskettes" and "mini-disk," as well as all the free standing "disk" in the data file. It also searched through an ASCII-saved BASIC program for a specific variable. (As an aside, this utility helped me locate a bug in another program where the same variable name was assigned to two different variables.) The search routine is in machine language and is fast. The program author offers: "Since this program is attached to a BASIC driver, just RUN "FIND" to use it. And with a bit of imagination you can modify the BASIC portion of the program for your own use."

I saved reviewing the *MENU* utility for last (like dessert). This utility does several things that make life much simpler for the disk user. After putting the utility online, it reads the directories of all the drives in your system, then sorts the titles into alphabetical order and displays them on the screen a screenfull at a time. If more than 32 programs are to be displayed, they are put on "pages," which can be switched back and forth by use of the plus (+) or minus (-) key.

There is more! When the programs are listed on screen, the top-most program appears as light characters on a black background. Tapping the down-arrow key moves the "black box" down to the next program and it then appears with light letters on a black background. The arrow keys move the "black box" to either of the two columns on display or up and down the list.

There is still more! Once a selection is made by leaving the "black box" on a program title, just hitting ENTER will LOAD and RUN that program, no matter on which drive it is resident, or if it is BASIC or machine language. It sure makes finding and running a program from a batch of programs on several drives a real breeze.

The manual for *Disk Utility Package* is only three pages long, but covers all a user needs to know about using the utilities. The only quirk not mentioned in the manual is the need to have BASIC programs saved in ASCII in order for the *FIND* and *OCCOUNT* utilities to locate reserved words. Everything else worked as described in the instructions.

Remember to say "thank you" to Mr. van der Poel when you order *Disk Utility Package*, because I am sure that is what you will want to do after using it!

(CMD Micro Computer Services Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7; distributed in the U.S. by Saguaro Software, P.O. Box 1864, Telluride, CO 81435, disk $19.95 plus $2 S/H)

Two-Liner Contest Winner . . .

Trilabel is a label maker for "three-up," self-adhesive labels on 8½ by 11-inch sheets. It is set up to run on Epson, Star Micronics or Panasonic printers. It makes use of present tabs, is self-prompting and allows for a varying quantity of rows to be printed.

The listing:

```
1 CLS:INPUT"NAME";A$:INPUT"STREE
T";B$:INPUT"CITY";C$:INPUT"STATE
 & ZIP";D$:E$=", ":PRINT:PRINT"M
AKE SURE PRINTER IS READY":PRINT
:FOR A=1TO 10:INPUT"HOW MANY ROW
S OF 3 ACROSS";L:FOR X=1TO L
2 PRINT#-2,CHR$(27)"D"CHR$(29)CH
R$(57):PRINT#-2,A$CHR$(9)A$CHR$(
9)A$:PRINT#-2,B$CHR$(9)B$CHR$(9)
B$:PRINT#-2,C$+E$+D$CHR$(9)C$+E$
+D$CHR$(9)C$+E$+D$:PRINT#-2,CHR$
(10)CHR$(10):NEXT X:NEXT A
```

Tim Wright
Minerva, OH

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

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The Best Screen Dump Utility for Epson-Type Printers Lives Up to its Name

Taking a cumulative look at things, there seems to be no need for yet another screen dump utility. I have counted five such programs offered for sale in a recent RAINBOW, and another eight graphics programs offer a screen dump among their options. To gain our attention, there must be the promise of unusual convenience, features or price.

The Best Screen Dump Utility for Epson-Type Printers comes on a cassette and is easily transferred to disk. This contains a BASIC loader and two versions of the machine language program, one for 16K and one for 32K. For convenience, most users will prefer the BASIC loader, which enables you to set printer speeds and the like without separate operations. The program is menu driven, and offers such options as emphasized and double-strike print densities, normal, double (sidewise) and two-page printouts, inverse printing, variable line spacing (on the Epson adjustable to $^1/_{216}$ of an inch) and a View option that allows you to move the print area up and down for minor adjustments.

No two people have the same demands, of course, but *The Best Screen Dump Utility* has two great advantages over Custom Software Engineering's *GSPRE*, which has been around long enough to be the standard against which such programs are measured. First, the double screen option gives the most nearly correct aspect ratio (relation of height to width) I have yet seen; second, ease of installation. Where *GSPRE* is still superior is in its ability to use all `PMODE`s (*The Best Screen Dump Utility* operates only on the `PMODE 4` screen) and to put the printout where you like on the paper.

The manual (six typescript pages) explicitly warns you: "This program will print any image you can get onto a Hi-Res graphics screen — getting the image on the screen is your problem," and follows this up with some sound advice. But it remains true that the display screens of some highly protected software are not normally possible to print, and other screens will give unusual problems.

For instance, I cannot prevent the program from swapping the right-most seven pixels over to the left of the page and down one pixel when printing *Graphicom* screens; it does not center itself exactly vertically, either. The latter problem is easily cured by positioning the screen "window" one position off, using the arrow keys in View mode (this is clearly explained in the manual). For the former I have no solution. In many cases this imprecision at the edges makes no difference at all.

The general advice to at least `PCLEAR 4` before running *The Best Screen Dump Utility* is sound, but do not expect very satisfactory results from animated screens. Colored passages print as striped or textured because of the way `PMODE 4` gets its colors. Neither of these problems is the fault of the program.

Among its many attractions is the fact that this program is not protected in any way. Another is that it is inexpensive. If the problem with *Graphicom* screens can be tolerated, it is a very good buy.

(CMD Micro Computer Services Ltd., 10447 - 124 Street, Edmonton, Alberta, Canada T5N 1R7; distributed in the U.S. by Saguaro Software, P.O. Box 1864, Telluride, CO 81435, 16K or 32K, requires Epson printer with Graftrax or equivalent, cassette $14.95 plus $2 S/H)

— R.W. Odlin

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One-Liner Contest Winner. . .

This short program, called *Grader*, is mighty useful to students who have a number of test grades and want to compute their grade average. All grades must be entered in number form.

The listing:

```
1 CLS:T=0:G=0:A=0:INPUT"# OF TES
TS";N:FORX=1TON:INPUT"GRADE";G:T
=T+G:NEXTX:A=T/N:PRINT"YOUR AVER
AGE IS ";A:INPUT"AGAIN";A$:IFA$=
"Y"THENGOTO1ELSEEND
```

Judy Zoll Leo
Skillman, NJ

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape*.)

A Different Adventure Every Time with *Escape from Denna*

Escape from Denna is a role-playing Adventure game in low resolution graphics. This game is in the spirit of a Dungeons and Dragons-type game, with a few twists, a few drawbacks and a lot of fun.

The first drawback is loading the program. According to Ark Royal Games, the documentation should be stamped with a `PCLEAR 1`, but there are no loading instructions. For the benefit of potential users: To load *Escape from Denna* properly, turn the computer off, wait five seconds, then turn the computer on again. Type in `PCLEAR 1`, press `ENTER` and `CLOAD "DENNA"`. After you have loaded the program, type `RUN` and you are greeted with a colorful title screen.

Next you must build a character, and here there is both some similarity to and some departure from a role-playing game. There is a complete set of character attributes, but you have an unlimited amount of choices before you must accept a character's strength, agility, physique and so forth. Most role-playing games limit your amount of choices to around three attempts per attribute, but here you can wait for the numbers to be to your liking.

After the dungeon has been prepared, you are greeted with a screen consisting of a small window, as though looking down from above, on a maze. The maze contains important items, such as weapons and treasures, furniture of various types and wandering monsters. The overall goal is to escape Denna alive. This is not as easy as it sounds — dead ends, bad monsters, falling blocks of stone, arrow traps, trap doors . . . an Adventurer should break out into a cold sweat at the very thought!

Monster encounters are really well-done, in that each monster has a specific set of attributes just as you do, and may attack you just as you can attack it. Part of what makes the program fun is author Dan Tharp's use of changing screen colors and sound effects that at times resemble an electronic pinball machine. One sound effect I didn't like: When you encounter a monster, the screen flashes on with the monster and a siren goes off; it will not stop until you hit a key to stop it. It can get irritating after a few encounters.

However, surviving and growing in experience points and getting stronger can all be fun. It only took me about a week to escape from Denna (and a lot of characters!), but I was eagerly looking forward to returning since the game does randomize certain factors each time it is run. One especially nice feature of Denna is a command screen (which is entered by hitting the space bar) from which you can look around at certain things in detail, place objects, take inventory or status on your condition, change weapons, etc., without leaving your current position. This is a nice convenience feature, but beware — a monster can be anywhere!

Escape from Denna's documentation consists largely of factors that go into making characters, how attacks are measured and designed, and what factors such as experience, weaponry, etc., are considered in each encounter. This is a thoroughly detailed explanation of play that must be completely digested to really understand the workings of the game. It must also be read carefully for instructions on how to play the game.

All in all, *Escape from Denna* is an interesting, compelling and fun game. It lacks sophisticated graphics, but does have other elements, such as the monster encounters and attempting to solve the maze and escape, which really do make up for the missing graphics. *Escape from Denna* is a little high priced, but for a different game every time and a lot of fun and adventure, it is well worth it.

(Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette $25.95, disk $28.95)

— Jeffrey S. Parker

Hint . . .

Repairing Deluxe Joysticks

There have been a number of reports of problems with Radio Shack's Deluxe Joystick, where the stick becomes loose and you no longer have control. I've found that a pin that holds one of the control levers to the joystick ball tends to work itself out of the ball.

After opening the joystick case, you'll see a pin on one of the levers that now faces the case instead of the ball. Hold the stick so that the hole in the ball lines up with this pin, and use needle-nose pliers to push the pin back into place.

– Ed Ellers

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Booklet Review

The CoCo Chronicles — A Beginning, of Sorts

My first impression of *The CoCo Chronicles, A History of the CoCo* was that, at $14.95 plus $3 S/H, it was embarassingly overpriced. It is an unbound (edges stapled), 31-page, illustrationless booklet with paper covers and produced using a daisy wheel printer. Unfortunately, subsequent readings did little to alter my opinion.

I finished the entire 26-page history in a single reading. In this very rough first draft, I found an adequate idea, but half-formed, and poorly executed. As a brief and informal history of the Color Computer, spanning from Radio Shack's early cooperative ventures with Motorola (a weather and agriculture computer) in the mid '70s, through the introduction of the CoCo in July 1980 and up to the present, *The CoCo Chronicles* is presentable reading if the emphasis is understood to be on the adjective "informal."

The sources for *The CoCo Chronicles* are advertisements, numerous Color Computer periodicals, both existing and defunct, interviews, correspondence, printouts and files from old bulletin board sessions.

The opinions of the author figure prominently throughout, and the impression received is one of having its author, identified as "Alfredo(!)," sitting in your living room and telling you the history of the CoCo from his personal observations and experiences.

Several pages are also written about the European-made Dragon computer, including a table relating the memory addresses of ROM entry points in the CoCo and Dragon computers. Such a table is of interest to anyone wishing to transport programs from either system to the other.

The editing and production values of this 30 minutes' worth of reading are very poor, and the booklet is chock-full of typos including mispellings of proper names, which is a clear indication of carelessness. Given such slapdash style, we can scarcely assume any greater attention to detail in reporting. Thus, the substance is also brought to question.

The last five pages comprise an appendix; it includes a bibliography of related books, a table showing the Computer Plus (a mail order retailer) prices for most CoCo configurations from 1981 through 1985, a listing of major software and hardware and a list of the author's favorite products — software, hardware, books and magazines.

The author, Alfredo (!), states in his prologue that this booklet "was, to say the least, a labor of love." The love is clearly apparent from his highly personal narrative style, but the labor is sorely lacking. If this reminiscence were nominally priced, this trip through CoCo's history would be an amusing excursion, but in its form and at its price, skip it.

(Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, $14.95 plus $3 S/H)

— Angela Hartford

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This is a very useful disk utility that will help eliminate wasted disk space. Shrinker will take a series of small programs saved on disk and convert them to a space-saving format. Why waste one whole granule of disk space if the program only requires part of one? Disk access will remain the same, the program is RS DOS compatible, and very easy to use. No hassles, just improved use of disk space and more money in your pocket!

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OS-9 UTILITIES

This is a set of three separate utility groups for use with the OS-9 disk operating system. You may purchase one of the groups separately, or buy two or three and save!

Group No. 1
Contains a series of utilities for programmers. It includes the following:
HEAD - displays a variable number of lines starting at the top of a file.
TAIL - displays a variable number of lines at the end of a file.
MV - moves a file from one directory or disk to any other directory or disk.
PRL - prints a formatted file listing that will add line numbers, pagination, etc.
FF - creates a list of functions from a "C" source listing
MERGE - will merge one or more files together into one single file

Group No. 2
A series of helpful general utilities for all OS-9 users and programmers. Included are:
HELP - disk resident help system that avoids tying up valuable memory but that provides on-line help descriptions of almost all OS-9 commands that are commonly found in the OS-9 system and popular system upgrades
UNIT - this utility provides descriptions, units, and constant conversion factors for hundreds of scientific and technical terms, measures, constants, etc.
ERR - provides on-line descriptions of numeric error codes. Does not take any extra memory as the normal error routine does.

Group No. 3
This third group of utilities is written in BASIC09. It includes:
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"To complicate matters, I see in the distance a volcano pewing smoke and ash — as if it's about to erupt!

"My only hope now is to find the treasure and escape this sland before I either die of thirst or the volcano erupts and uries the island in lava."

This describes the Adventure game *Blackbeard's Island*, rom Novasoft. I am not an experienced Adventurer, but found this disk-based, machine language game for 32K olor Computers to be well-done and very entertaining. In ddition to the running narrative, each step is displayed on he screen. In the beginning you are standing on the beach ear a large log. When you discover the volcano, it is shown mitting smoke clouds. As you move about the island, your xploration is graphically depicted.

I "worked" with this Adventure for hours. I have died innumerable deaths from dehydration, fallen to my death from a cliff overlooking the ocean, and plunged to my death into a ravine — but I'm still trying! I found a number of articles that proved useful during my quest, but I have yet to find the treasure.

When playing an Adventure game, one important aid is a list of the verbs the program recognizes. This can be obtained with the command VOCAB. And, in case you forget what items you have found, the command INV (for inventory) provides that list. This game even has a HELP command. (Although I haven't found it to be of any real value. The usual response to HELP is "Who's playing this game — you or me?")

A nice feature of *Blackbeard's Island* is that play can be interrupted and you can save your progress up to that point. This way, you can resume explorations without having to start over at the beginning.

To give a little "flavor" of what you may encounter, I have explored the following scenes: a native hut, a waterfall, a hidden room, a tunnel, a beach, a forest, a pond, a cliff and a staircase with a trap door.

At this stage, I fear I've become addicted — I've resolved to continue my exploration until I discover treasure. (Remember, I've already found a way off the island!)

(Novasoft, 4285 Bradford N.E., Grand Rapids, MI 49506, disk $19.95)

— Jerry Oefelein

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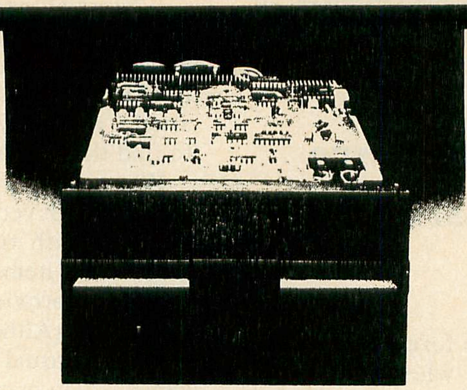

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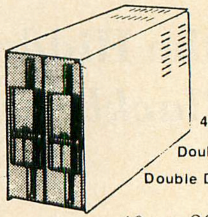

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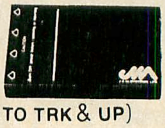

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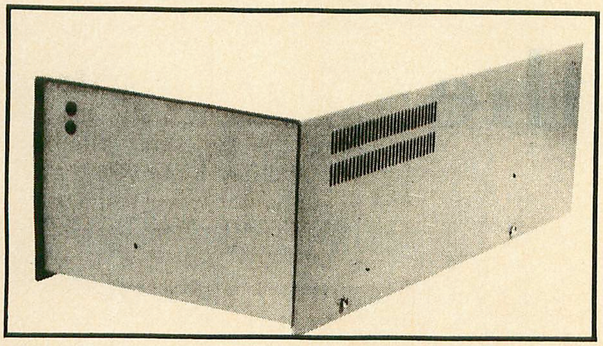

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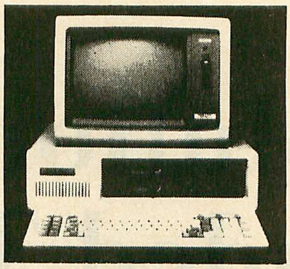

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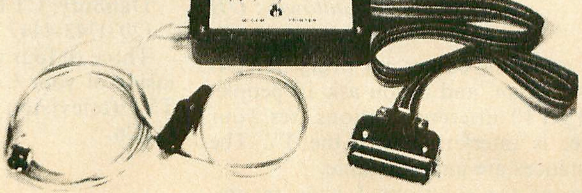

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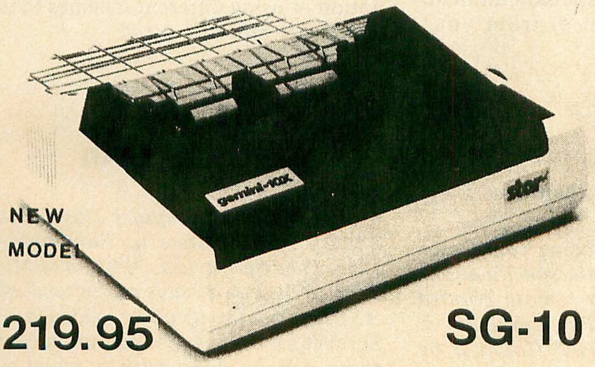

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DOWNLOADS

A Solution for the Dreaded TVI

By Dan Downard
Rainbow Technical Editor

• *My computer is in the basement of my house. Our living room, with a large TV in it, is directly above the computer room. When someone upstairs is watching television and the computer is turned on, two of the five available channels become blurred with wavy lines. My question is: Does the computer being located directly below the TV room have anything to do with the interference? Can I buy some sort of cable that reduces the interference?*

Brian Biggs
Galloway, OH

Your question comes up every RAINBOWfest, Brian, and if you ask 10 people, you will get 10 different solutions. Yes, your computer is interfering with the TV. The circumstances are unpredictable.

A few of the solutions I have recommended have been installing a high-pass filter on the antenna input terminals of the TV. A cable with better shielding could be substituted for the CoCo-to-TV connection.

A seminar attendee at the recent Princeton RAINBOWfest had one of the best solutions I have heard: a product called RFI Conductive Coating, manufactured by Miller-Stephenson. If you want black, order MS-485. The corresponding product in beige is MS-490. MS-485/MS-490 is a coating that may be applied to plastic to absorb RFI/EMI over a broad frequency range. It is fairly expensive (about $7 a can) and can be ordered only in minimum quantities, but should help your problem.

For further information, contact:

Miller-Stephenson Chemical Co., Inc.
George Washington Highway
Danbury, CT 06810
(203)743-4447

Three to four coats of this aerosol to the inside of your CoCo case should eliminate TVI (television interference) from your CoCo.

(Dan Downard is an electrical engineer and has been involved in electronics for 25 years through ham radio [K4KWT]. His interest in computers began about six years ago and he has built several 68XX systems.)

Two Pins are Better than One

• *While reading my* Introducing Your Color Computer 2 *book, I saw in the specifications section that there are two remote control pins in the cassette jack, Pin 1 and Pin 3. Why are there two of them? Could it be possible to control two recorders from the one jack?*

If you look at the pinout on Page 39, pins 1 (remote control) and 4 (EARphone input) are together on the jack's left side, and Pin 3 (remote control) and Pin 5 (MIC output) are together on the right side, with Pin 2 (signal ground) in the middle. Is it just coincidental that they are close together, or was it that at one time the idea of a CoCo with two cassette recorders had been planned and then dropped?

Craig Lillie
Nixa, MO

Pins 1 and 3 are indeed the remote control outputs of the casette port, Craig. Inside your CoCo a relay contact (normally open) is connected between these pins. Otherwise, both pins are necessary to control the motor interface to your tape recorder. This is for isolation purposes, but also gives Tandy the option of using different schemes to turn on the casette motor.

ASCII CLOAD

• *I have a Color Computer 2 (64K Extended* BASIC*). In a "Letters to Rainbow" [April 1985, Page 6], David L. Watson of Midland, Texas, tells how to save a program using the ASCII format so it can be loaded into* Color Scripsit *for editing. I've found that the same thing can be done with a cassette-based system by using* `CSAVE "program name",A.`

Here's my question: I can `CSAVE` *a* BASIC *program in the ASCII format, but how do you* `CLOAD` *an ASCII format?*

Steve Markley
Sun Valley, CA

A program saved in the ASCII format can be reloaded, Steve, by the regular `CLOAD` command. When loaded by BASIC all of the ASCII commands are tokenized, or crunched, before being stored in memory.

Computer Buzz

• *I have a 64K Extended CoCo 1. Whenever I leave my computer plugged in, but the power button off, it makes a very annoying buzzing sound. Do all CoCos do that, or is mine eating up valuable energy?*

Mitch Hart
Seattle, WA

Mitch, I'll bet there are very few CoCo owners who realize that even though you turn off the power switch on your CoCo the transformer in the top left corner is still energized. The power switch is on the secondary of this transformer.

There is nothing unsafe as far as the life of your CoCo, but be careful; always unplug your CoCo before attempting any repairs. There are AC voltages present, even if it's turned off.

A Solution for *The Solution*

• *I would like to pass on the following information to THE RAINBOW readers. For those who purchased* The Solution *from Snake Mountain Software (now defunct) and cannot use it with the relatively new Disk BASIC 1.1 ROM, I have "the solution"!*

`POKE 31729,215:POKE 31730,95` *after* `LOADM` *at 30976 ($7900) on a 32K Color Computer and before executing. For 16K, offset 242 ($F2) from the starting address. This replaces the* `DSKCON` *address of $D66C of the older Disk BASIC 1.0 ROM with the newer $D75F of the 1.1 ROM. I got the idea from a letter to "Downloads" by Dave Bell in the September 1985 issue. Mr. Downard's response to Mr. Bell gave the* `DSKCON` *addresses. I pulled out my Radio Shack* EDTASM+ *and found where $D66C was.* `POKE`*ing after loading the program works fine.*

The Solution *gives a nice 42 by 21 (or 51 by 21 with the extender) character screen. With Disk BASIC 1.1 ROM, direct access files cannot be used as the* `GET` *command returned an error code. I hope this helps purchasers of this fine piece of software.*

Bill Frankart
Spokane, WA

Thanks for the tip, Bill. I have used *The Solution* a few times myself.

Wrestling with ROM Packs

• *I used a program from the October 1984 "Downloads" column to transfer my ROM packs to disk. I ran into several problems not addressed in your article.*

First off, I noticed you suggested loading the programs from tape while in the 64K mode. I assumed you also meant that to apply to disk-based operations. I use the Frank Hogg program to get in the 64K mode. Is it necessary to be in this mode to operate the ROM pack programs from disk?

Secondly, I find that the operation of the programs varies each time I load them. I am unable to get them to load and run consistently. I sometimes get garbage on the screen, or the computer locks up. Occasionally, they load and execute correctly, but that seems to be the exception rather than the rule. The particular ROM packs I have experimented with include the Maze *program and* Backgammon, *both from Radio Shack. Can you offer any suggestions as to what would make them load and execute consistently?*

Also, I have noticed sometimes when the program doesn't execute correctly, I am no longer in the 64K mode. I am able to tell because I step my drives at six milliseconds in the ROMRAM *program, and they change back to the slow speed.*

William Knight
Yakima, WA

You have to be in the 64K mode to transfer ROM packs to disk, William. Your disk system occupies addresses $C000-$DFFF in your CoCo memory map. This just happens to be the same addresses occupied by your ROM packs. That is why you have to save the ROM packs to tape first. If you're not in the 64K mode, Disk BASIC will be active.

As far as your consistent execution, I am not familiar with these two programs. I do know that on some other ROM packs Radio Shack has put a simple protection scheme to prevent RAM execution. It's up to you, or one of our more generous readers, to find it and replace it with NOPs.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `DANDOWNARD`.

You Asked for It!

• *Could you publish a listing of the interupt hooks located in low memory locations eginning at &H160? For instance, I know hat locations &H167 - &H169 are for print nterrupt, and locations &H16A - &H16C re for input interrupt. These are very useful evices whose programming muscle is lim-ted only by the imagination.*

John Petruna
St. Marys, PA

As Jack Smith used to say, "OK, John Petruna of St. Marys, Pennsylvania, you asked for it!" To have a thorough understanding of RAM hooks you almost have to have a disassembly listing of BASIC, but here is a summary.

Be careful, John. Address $01A0 is used by several different functions. For a further explanation, I suggest obtaining *Color/Extended/Disk BASIC Unravelled*, from Spectrum Projects. This three-book set by Spectral Associates is a complete disassembly of BASIC.

Default Addresses

Address	Color BASIC	Extended BASIC	Disk BASIC	Description
$015E	$A5F6		$C426	Open command
$0161	$A5B9		$C838	Device number check
$0164	$A35F		$C843	Print parameters
$0167	$A282	$8273	$CB4A	Console out
$016A	$A176	$8CF1	$C58F	Console in
$016D	$A3ED		$C818	Input device number
$0170	$A406		$C81B	Print device number
$0173	$A426		$CA3B	Close files
$0176	$A42D	$8286	$CA4B	Close file handler
$0179	$B918	$8E90	$8E90	Print
$017C	$B061		$CC5B	Input
$017F	$A549		$C859	Break check
$0182	$A390		$C6B7	BASIC Input
$0185	$A4BF		$CA36	Term line input
$0188	$A5CE		$C860	EOF
$018B	$B223	$8846	$CDF6	Eval expression
$018E	$AC46		$C6B7	On error `GOTO`
$0191	$AC49	$88F0	$C24D	Error driver
$0194	$AE75	$829C	$C990	Run
$0197	$BD22	$87E5		ASCII/FP conv
$019A	$AD9E	$82B9		Command interp loop
$019D	$A8C4			`RESET/SET/POINT`
$01A0	$A910		$C29A	`CLS`
$01A3	$B821	$8304		Crunch line
$01A6	$B7C2			Uncrunch line

OS-9 TUTORIAL

Creating OS-9 System Disks

By Donald D. Dollberg

The OS-9 operating system has been available for the Color Computer for some time now, and many CoCo users have rushed out to buy it. Also, many Radio Shack dealers have claimed that you must have OS-9 to use all 64K on the CoCo. It is a system that has been praised as well as cursed by many. Most would agree that it is an excellent operating system, but, for many, a very complex and difficult system to learn.

With the advent of BASIC09, C and PASCAL09, as well as the release of a number of applications programs such as *DynaStar*, *Stylograph* and *DynaCalc*, the system should now see more widespread use. Similarly, the introduction of enhancements such as *SDISK* and the *Word-Pak II* have added increased capability/versatility. However, some of these enhancements require the user to perform a number of manipulations to create a new system disk. Creation of new system disks is not always an easy task, especially when merging new enhancements to the system. Those who are experts in OS-9 may not agree with such a statement, but the newcomer is certainly not given sufficient information on making new system disks. This article is an attempt to put the topic in perspective.

(Don Dollberg, a commissioned officer in the U.S. Public Health Service, holds a doctorate in inorganic chemistry and has been programming for over 15 years. With Richard A. White, he is co-author of TIMS, *a database management program.)*

Before we begin, let's have a look at the system disk in the form it is received from Radio Shack. For those who haven't used OS-9 but may be reading this article out of curiosity, the system disk contains a number of files that are grouped into directories. Unlike Disk BASIC, which allows only one directory per disk, OS-9 allows many directories (within reason).

The system disk includes the OS-9 Boot, the system commands directory, two system directories and a special file known as the start-up file. The Boot file contains a number of modules that allow CoCo to interact with the monitor, keyboard, disk drives, printer, modem, etc. Remember, the BASIC ROMs have been turned off, so OS-9 must provide these functions. The start-up file, while not absolutely necessary for operation, contains a list of instructions determined by the user that tells OS-9 what to do when it is first booted, e.g., set the system clock, set printer parameters, execute an application program, load a language, etc. One of the two system directories contains a number of files for assembly language programming and the other contains the error message file, password file (for time sharing) and any other files the user may wish to add to this directory.

The purpose of this article is to discuss methods of creating system disks, starting with the perhaps mundane task of backing up the original system disk to the somewhat complex task of modifying the Boot file. Actually, you may wish to have several different system disks depending on your needs. For example, a general disk, a disk for BASIC09 and another for word processing.

Let's start at the beginning. You just bought OS-9 and, like any other software package, the first thing to do is create a backup copy of the system disk. This, of course, is the the easiest thing to do since OS-9 has a Backup command. However, before you back up the master disk, you must format a new disk. This is accomplished with the FORMAT command.

```
OS9: format /D0
```

With a freshly formatted disk in hand, you can then proceed to back up the system master. On a single drive system you will have to exchange the master and backup disks just as in Disk BASIC. To begin the process, enter (with the system master still in Drive 0):

```
OS9: backup /D0 #40k
```

It is important to note the #40k. This tells OS-9 to set aside 40K of memory as a buffer for the backup process. Doing this reduces the number of times you have to swap disks. If you happen to forget this statement, I can assure you that you won't do it a second time — it takes forever to make the backup! If you have two drives, backup is quite a bit simpler.

```
OS9: backup /D0 /D1 #40k
```

Even with two drives it is worth setting up the buffer. This way, OS-9 reads in a large segment of the disk into memory and writes it out to the backup disk. If you don't set up the buffer, OS-9 appears to copy sector by sector. Now

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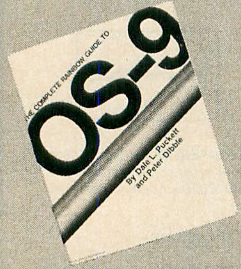
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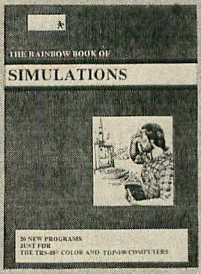
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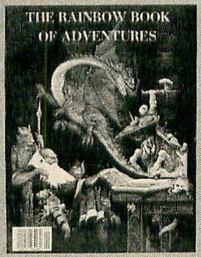

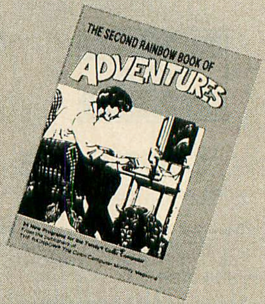

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that you have a backup, you can put the master away in a safe place.

COBBLER

Suppose you have just purchased BASIC09 and want a separate disk for BASIC programming. Since you don't want to use the BASIC09 master disk, format another disk and use the COBBLER command to place the OS-9 Boot file on the new disk.

```
OS9: cobbler /D1
```

COBBLER writes a boot file to a newly formatted disk that is an exact duplicate of the current boot. Once a boot file has been prepared, the remaining files on the old system disk must be copied to the new system disk using procedures to be described below.

One can do some limited modification of modules before they are added to the boot. Dale Puckett, in his "KISS-able OS-9" columns, has discussed several procedures for modifying Tandy's disk drivers. Also, using XMODE, one can modify the printer module to correspond with the Baud rate of the system printer using the following command: OS9: XMODE /P baud=3 (where '3' is the code for 1200 Baud). If we follow this command with COBBLER, the new system disk will contain the changes.

Once you have a disk with a new Boot file, you can copy the appropriate files and directories to the disk to suit your needs. If you wanted a system disk for BASIC09 and had limited disk space, you could eliminate a number of commands from the CMDS directory that would not be needed while programming in BASIC. BASIC09 can then be copied to the CMDS directory on the new system disk. This topic has been discussed in several issues of THE RAINBOW by Dale Puckett and Frank Hogg, so I won't dwell any further on it.

Actually, what prompted writing this article were the recent purchases of *SDISK* and *Word-Pak II*. Both of these packages come with excellent documentation for their implementation. In fact, each comes with a procedure file that automatically creates a new system disk.

But, what if you want to implement both? Each procedure file assumes you are starting with the original OS-9 system disk as purchased from Tandy. Therefore, the first implementation goes OK, but the second results in an error message because the second procedure file is "looking" for modules that have been replaced by the first implementation. Thus, the smart OS-9 user sees the need for learning the use of the OS9Gen command for future system upgrades.

OS9Gen

Let's look at the OS9Gen command for the preparation of a new system disk where some modules are to be either updated or added/deleted. Adding new modules is the simplest process, so we'll start there.

Suppose you want to add the T2 module for communication with the deluxe RS-232 cartridge. The OS9Gen command can be used to add this module to the Boot. There are actually two ways to use this command. One way, which I will refer to as "manual installation," requires the user to enter from the keyboard the information OS9Gen requires to prepare the Boot file. The alternative approach is to place this information in a text file that will be read by OS9Gen. Let's use the first approach:

```
OS9: OS9Gen /D1
/D0/OS9Boot
/D0/T2
```

In the first line, the OS9Gen command is executed for the preparation of a new Boot file on /D1 using the information supplied on the subsequent lines (i.e., OS9Gen waits as you enter each line). Lines 2 and 3 inform OS9Gen that the new Boot is to be made from the current Boot plus the module T2, which can be found in the root directory /D0. Data entry from the keyboard is terminated by entering an empty line (i.e., a carriage return).

If you prefer the alternate approach, then use BUILD or EDIT to prepare a text file that contains the OS9Gen input. This file can be saved to disk as */D0/makeboot*. To make a new Boot, simply enter the command:

```
OS9: OS9Gen /D1 </D0/makeboot
```

In this command line, we have called OS9Gen and redirected the input from the keyboard to the disk file */D0/makeboot*.

Changing the Boot File

Now suppose you want to change modules in the existing Boot file. As we asked earlier, why would you want to do this? To start with, Radio Shack included in the OS-9 system a module named CCDISK. This module tells OS-9 that the disk drives connected to the Color Computer are 35-track double-density, single-sided and have a step rate of 30 ms. To allow for the use of most types of disk drives, several software houses, D.P. Johnson and Computerware, for example, have developed alternative modules. D.P. Johnson's package is known as *SDISK* and Computerware's revised *CCDisk* is contained in a set of OS-9 utilities. In either case, the process of replacing the original CCDISK module by either of the replacement modules is the same. For this discussion I'll refer to *SDISK*.

To install *SDISK*, the CCDISK module must be replaced by the *SDISK* module. Also, the device descriptors, /D0, /D1, etc., must be changed so they describe the drives on the present system. For example, on my system, /D0 is a Tandon 40-track, single-sided drive with a six ms. step rate and /D1 is the standard Radio Shack drive — 35 tracks with a 30 ms. step rate, but also capable of a 20 ms. step rate. If you only have two drives, it is not necessary to add descriptors for /D2 and /D3. The changes to these device descriptors are easily accomplished with a program supplied with the *SDISK* package and need not concern us further. Assuming the changes have been made, let's make a new system disk.

We start out by creating a directory with the MAKDIR command, e.g., */D0/MODULES*. Next, all of the modules required for OS-9 are saved to this directory, except CCDISK. If you are not sure what these modules are, then use the MDIR command. This command lists all modules currently in memory. If you run MDIR immediately after booting OS-9, you will obtain a list of all modules in the current boot. For a hard copy, simply redirect the output of MDIR to the printer, i.e., MDIR >/P. To save these modules, all you need to do is change the working directory to */D0/MODULES* and use the SAVE command to save each module as in the following example:

```
chd /D0/MODULES
SAVE IOMAN IOMAN
SAVE RBFMAN RBFMAN
SAVE /D0 /D0
etc.
```

Continue in this manner until all the modules contained in the MDIR listing have been saved, except, of course, CCDISK. After saving all the modules in memory, the next step is to copy the *SDISK* module to */D0/MODULES*.

Finally, we create a text file that serves as the input file to OS9Gen. This file, which we'll call */D0/bootlist*, contains a list of all modules, one per line, that are to be added to the Boot. Note: */D0/MODULES* is a directory that contains copies of all the modules to be included in the Boot; */D0/bootlist* is a procedure file that is a list of all modules to be included in the new Boot. Remember, OS9Gen must be able to find all the modules listed in */D0/bootlist*. If the modules listed in *bootlist* are not in the current working directory, then a full pathlist must be specified for each module not in the working directory.

While we are in the process of making a new system Boot, you might wish to add some commonly used commands such as DIR, LIST, DISPLAY, etc., to the Boot file. Once these commands are added to the Boot, they are permanent (until you make a new Boot). The advantage of doing this is speed. For instance, it is the equivalent of Disk BASIC commands because you don't have to wait for disk access. The disadvantage is that memory is taken up by these commands. Therefore, only include in the Boot those commands you use very frequently. DIR and LIST are obvious candidates. I included DISPLAY because it is used for screen and cursor control with *Word-Pak II.*

OK! We now have the modules directory and Boot list, which should look something like that shown in Table 1. To make the new system boot, enter: OS9: OS9Gen /D1 </D0/bootlist. Once the boot has been made, you can use DSAVE (to be discussed below) to copy all the system files and directories to the new disk.

Table 1
Memory Modules

OS9	OS9p2	Init
Boot	SDisk	D0
D1	D2	P
PRINTER	WordPakII	TERM
IOMan	SCF	RBF
SysGo	Clock	Shell
RS232	T1	PipeMan
Piper	Pipe	List
Dir	crt	Printerr

After you have a new system disk, what do you do with */D0/MODULES* and */D0/bootlist*? The smart OS-9 user will not delete them, but rather keep them on a separate disk along with a copy of the CMDS directory for future Boot preparation. In this way, you save all the aggravation and "disk grinding" of copying the modules to disk everytime you need to upgrade the system. All you lose is the price of one disk.

Since I had saved these modules after implementing *SDISK*, I was in good shape when I purchased the PBJ *Word-Pak II*. This device comes with two replacement modules for CCIO and TERM, which are modules in the original OS-9 package. To make a new system disk, I deleted CCIO and TERM from */D0/MODULES* and copied the two modules provided with *Word-Pak* into */D0/MODULES*. Using an editor, I changed the appropriate line in */D0/bootlist*. With these changes made, I used OS9Gen on a freshly formatted disk:

OS9: OS9Gen /D1 </D0/bootlist

When this process is complete, use DSAVE to copy the directories and files

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of the old system disk to the new system disk.

To summarize all of this, if you keep a separate disk that contains */D0/MODULES*, */D0/bootlist* and */D0/CMDS*, you can easily perform a major change to the OS-9 system by following these steps:

1) In */D0/bootlist*, delete the name of the modules that are not to be included in the new Boot.
2) Add to */D0/bootlist* the names of the new modules that are to be included in the Boot.
3) Copy the new or revised modules to */D0/MODULES*.
4) Perform OS9Gen /D1 /D0/boot list.

Copying Directories and Files

Our discussion thus far has focused on the preparation of a Boot file on a new disk. Once this has been accomplished, how do you easily move all of the files and directories on the previous system disk to the new system disk? Enter DSAVE.

The DSAVE command, according to the *OS-9 Commands Manual*, is used to copy all files in one or more directories. DSAVE creates a procedure file that can be executed to copy the directory in question. In other words, DSAVE generates command lines that copy files from the current data directory to the specified directory. DSAVE sends these command lines to the standard output path that can be redirected to a file in the current data directory or piped to a shell for immediate execution.

The advantage of redirecting to a file is that the procedure file may be edited so only selected files are copied. On the other hand, by piping DSAVE's output to a Shell you can have automatic copying in essentially one step. Let's look at both approaches.

The syntax for DSAVE, as described in the Commands manual, is as follows: OS9: dsave <–opts> <devname> <directoryname>, where "opts" are several options the user can select and are defined on Page 81 of the manual. The most useful option is "–s integer," which sets a buffer size of sK for the copy command. For example, –s20 sets up a 20K buffer for the copy command. Any integer value can be used as long as you don't exceed the amount of available memory. "Devname" is the device name of the current data directory. If the current data directory is */D0/CMDS*, then devname would be /D0. Finally, "directoryname" is the name of the directory that will contain the files which are copied from the current data directory. If this directory does not exist at the time DSAVE is executed, then DSAVE calls MAKDIR to create the required directory.

It is recommended that the other options be reviewed as they permit quite a degree of control for copying files and directories, including the Boot file. Since space is limited, I'll restrict this tutorial to the general usage of DSAVE.

If you use DSAVE as described thus far, you won't get too far. As mentioned before, the output of DSAVE is usually redirected to a file or piped to a Shell. Let's look at both approaches using the same example. We'll copy the SYS directory, which contains only a few files, but will illustrate the procedure. Using a two-drive system, we'll place the old system disk in Drive 0 and the new system disk in Drive 1. As previously stated, the first thing to do is change the working directory to the directory to be copied.

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```
OS9: chd /d0/SYS
```

Next, we use DSAVE and redirect the output to a procedure file, *makecopy*:

```
OS9: DSAVE -s20 /d0 /d1/SYS >/
d1/makecopy
```

This syntax says to copy files from the current working directory on device /d0 to the directory */d1/SYS*. Again, if */d1/SYS* does not exist, DSAVE calls MAKDIR to create the directory. When DSAVE is finished, simply execute the procedure file *makecopy*.

```
OS9: /d1/makecopy
```

To give you an idea of how DSAVE performs the directory copy, I have included a listing of *makecopy* in Table 2. If you want to copy all of the files in a directory, you can edit *makecopy* and delete the lines that copy files you don't want in the new directory. However, if you want to copy the complete directory, which is most often the case, direct the output of DSAVE to a pipe that results in immediate execution by the Shell. The syntax for this approach is as follows:

```
OS9: DSAVE -s20 /d20 /d1/SYS !
shell
```

I have seen other versions of this syntax that I have found to be confusing and, frankly, didn't work. This syntax has worked with no errors and is easy if you remember these steps:

1) Change the working directory to the directory to be copied with the Chd command.

2) Use DSAVE to copy the directory.
   OS9: DSAVE -s drive# newdirec tory! shell

If you're a member of the OS-9 Users Group (shame on you if you're not), you might want to get some of the library disks that have several directory copying utilities, such as *dcopy* and *graft*, which are useful for copying files and directories.

One final note for those with Disk BASIC 1.0. As you already know, you need two disks to boot OS-9, i.e., you don't have the DOS command that is included in Version 1.1. Several programmers have developed routines that substitute for the DOS command and allow single disk booting of OS-9. I refer the reader to two previously published articles in THE RAINBOW: Melvin Hefter, Page 291, March 1984 and Charles Robitaille, Page 282, February 1985. I have been using the Hefter procedure with no problems and recommend it over the other because it is the simpler of the two.

Table 2
/d1/makecopy

```
t
tmode .1 -pause
makdir /d1/SYS
chd /d1/SYS
load copy
Copy /d0/SYS/password password
Copy /d0/SYS/errmsg errmsg
Copy /d0/SYS/motd motd
unlink copy
tmode .1 pause
```

We've covered a lot of material! It is my hope that this article makes it easier to update/modify your OS-9 system disk with only a minimum of aggravation.

Acknowledgement: I wish to thank my good CINTUG friends Richard White, James Hornsby and Dennis Zaebest, and a fellow computerist, Martin Abell, for their constructive reviews of this manuscript.

(Any questions you have about the procedures mentioned herewith may be directed to the author at 8745 Mockingbird Lane, Cincinnati, OH 45231, phone 513-729-0536. When writing, please include an SASE.)

Two-Liner Contest Winner. . .

This two-liner creates a rainbow on the screen and plays a complementary tune.

The listing:

```
10 PMODE4,1:PCLS:POKE178,2:DRAW"
BM10,10ND20R10D10L10F10BR10NR10U
10NR5U10R10BR10ND20R10F4D12G4L10
":SCREEN1,1:FORD=1TO5000:NEXT:CL
S:PRINT@135,"CREATING GRAPHICS":
PMODE4,1:PCLS:FORR=100TO160STEP1
0:CIRCLE(128,R),140,,.5,.55,.95:
NEXTR
20 FORT=32TO82STEP10:READC:POKE1
78,C:PAINT(128,T),,1:NEXTT:DATA8
,14,21,59,16,60:SCREEN1,1:PLAY "
P4L4CO4CO3L8BGABO4L4CO3CAO3L4GT5
P1T2CAL8ECDEL4FL8DO2BO3CL4DL8EL4
C":FORD=1TO10000:NEXT
```

John Fenix
Marion, OH

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

Two-Liner Contest Winner. . .

This two-line program rolls a pair of dice each time a key is pressed.

The listing:

```
1 PMODE0:PCLS:SCREEN1:DRAW"BM48,
48;R60D60L60U60BR99R60D60L60U60"
:FORI=0TO1:X=60+I*99:A=RND(6):B=
A>1:C=A>3:D=A=6:E=A/2=INT(A/2):P
SET(X,60,-B):PSET(X+36,60,-C):PS
ET(X,76,-D):PSET(X+18,76,1-E):PS
ET(X+36,76,-D):PSET(X,96,-C):PSE
T(X+36,96,-B):NEXT
2 I$=INKEY$:IF I$=""THEN2 ELSE1
```

Richard Pitel
Brush Prairie, WA

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

ACCESSIBLE APPLICATIONS

Getting Started with BASIC09

By Richard A. White
Rainbow Contributing Editor

You have been reading about spreadsheets in this column for over six months. I know from letters that many of you have been following the articles and are using spreadsheets now. However, broad as the topic may be, there are other interests to be served.

Over the past few months, I have been learning and programming in BASIC09. Dale Puckett is right on target in praising BASIC09. I hope the tutorials I provide in the coming months will bring you to a similar conclusion.

Under OS-9, there is a wealth of programming languages. assembly language is the same as under Disk BASIC, except for the program/machine interface. Brian Lantz has recently covered Assembly language under OS-9 in THE RAINBOW. A series on PASCAL by Dan Eastham graced the pages of "RainbowTech" some time ago. While the very good DEFT Compiler was highlighted, Radio Shack's Microware PASCAL Compiler is likewise a powerful compiler under OS-9. Another programming language available under OS-9 from Radio Shack is Microware's C Compiler, possibly one of the very best C compilers for a microcomputer.

With these options, why program in BASIC09? BASIC09 is designed for structured programming, but so are PASCAL and C. C is very powerful and terse, although it is not particularly easy to learn. If you have done some assembly language programming and want higher programming productivity while staying close to the machine, C is probably for you. I know one programmer who held out for years before trying C and then wondered why he had been so bull-headed for so long.

Then there are the rest of us, many who have been programming under BASIC and want to do more under OS-9. BASIC09 provides a nice transition language since the key words you have learned under BASIC have the same meanings under BASIC09. Some of the pains in BASIC, like line numbers, are gone (you can still use them, but it's like shooting oneself in the foot). The automatic handling of variables you are used to is gone, but it is replaced by powerful structuring options that provide economy, clarity and speed.

BASIC09 provides a rich selection of control structures, including LOOP . . . ENDLOOP, REPEAT . . . UNTIL, WHILE . . . DO . . . ENDWHILE and EXITIF . . . THEN . . . ENDEXIT, in addition to FOR . . . TO . . . NEXT and IF . . . THEN . . . ENDIF. Both the IF and ENDIF constructions permit the use of ELSE. For those who have no previous experience with some of these structures, take my word that they are indeed nice to have.

If you are a fan of disk files, you will find BASIC09 different from the Microsoft BASIC in the CoCo, perhaps a tad more complex, but also more powerful. With one statement such as PUT #PATH, myfile, you can save a whole 10,000-byte data structure to disk as a machine code dump, which is fast and easy. Load it back with GET #PATH, myfile, which is as equally easy and fast.

BASIC09 is designed to encourage writing program modules. Subroutines are named (no more wondering what `GOSUB 33` means), stored separately from other modules and run by name. This can save memory since only those procedures being used need be in memory. Such is not the case with PASCAL, where procedures must be defined and be in memory before they can be used. Variable names are local to modules, that is, you can use the same variable name in a number of modules to mean similar things. For example, "count" in the main program does not change when "count" in a subroutine is incremented, unless you specifically write the program so that happens. Long variable names are significant so that "count1" is different from "count2."

Perhaps I have left the status of PASCAL as a fuzzy choice. In fact, the choice between PASCAL and BASIC09 under OS-

(Richard White lives in Fairfield, Ohio, and has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS *database management program.)*

9 is not easy. One reason to choose PASCAL is that its programs can be compiled to machine language. Those who intend to take high school or college programming courses should opt for PASCAL simply because most institutions encourage beginning students to take PASCAL. Further advanced placement tests are standardized on PASCAL.

For the rest of us, the transition from BASIC to BASIC09 is easier than the transition to PASCAL. And, "byteheads" will probably take the next step to PASCAL as well.

To get started, buy the BASIC09 Compiler ($99.95) from your Radio Shack store. Also, buy *The Official BASIC09 Tour Guide* by Dale Puckett, which is now available from Radio Shack. Then, follow the rest of this article step by step.

When BASIC09 first appeared, the cry went up, "It won't load!" It was a directory problem. Under OS-9, if you just type the procedure name, that procedure must be in memory or in your CMDS directory to load and execute. The BASIC09 disk comes without a CMDS directory. Therefore, the very first order of business is to copy BASIC09 from the distribution disk to the CMDS directory on a system disk or to the CMDS directory on another disk if you are running two or more drives. Unlike C, BASIC09 does not require more than one disk drive.

There are two filenames on the distribution disk, *BASIC09* and *RUNB*. *BASIC09* includes the interpreter, an editor that is nice for a line editor, which as a class, ranges from poor to horrible, and a debugger. *RUNB* is a special interpreter that runs packed BASIC09 modules. *RUNB* is half the size of *BASIC09*, and packed BASIC09 modules are a quarter to a third smaller than their source code. Packed modules run faster, though unpacked ones are fast compared to Color BASIC. Downstream, you will need to have *RUNB* in the CMDS directory along with packed BASIC09 modules.

> ***". . . those who have been programming under BASIC and want to do more under OS-9, BASIC09 provides a nice transition language since the key words you have learned under BASIC have the same meanings under BASIC09."***

I am back to a practice I follow under Disk BASIC. I make up a single disk for an application that includes the program modules and my working files. This way, I stick the disk in, boot the application, load any work files and go. This works even better under OS-9 where I have a special start-up file that automatically boots the application, setting a large memory buffer automatically.

I make an OS-9 system disk that includes *OS9boot* and its various utility procedures in the CMDS directory. Some of the procedures that come with OS-9 are never used with BASIC09 and should be discarded while making your BASIC09 system disk. There are a number of ways to approach this project, depending on how fancy you want to get. We will show an easy way, then refer to some more complex approaches that utilize more of OS-9's power.

Making a Single Drive BASIC09 Disk

First, format a disk. Type `FORMAT /D0` at the OS-9 prompt. OS-9 loads the FORMAT modules and asks if you are ready. Now remove your system disk from Drive 0 and insert a fresh disk. Press 'Y' and that disk will be formatted.

The second step is to back up a system disk onto the newly formatted one. Exact examples of how to do this are shown on pages 63 and 64 of your red *OS-9 Commands Manual* for either two-drive or single-drive systems, so I won't duplicate them here. At this point, put your original system disk safely away and work with the backup. Type `FREE` and you will see that of 630 sectors: 84 are free and the largest block is 81 sectors (when using Version 01.01 of OS-9). This is on a 35-track disk.

Though 84 sectors is not much to work with (particularly when we have yet to copy *BASIC09* and *RUNB* onto the disk), there is quite a bit on the disk you will never need with BASIC09, so housecleaning is in order. We can start with the CMDS directory, which starts out like this.

```
Directory of /D0/CMDS 11:36:40

asm         attr        backup
binex       build       cmp
cobbler     copy        date
dcheck      debug       del
deldir      dir         display
dsave       dump        echo
edit        exbin       format
free        ident       link
list        load        login
makdir      mdir        merge
mfree       os9gen      printerr
procs       pwd         pxd
rename      save        setime
shell       sleep       tee
tmode       tsmon       unlink
verify      xmode
```

ASM is the assembler, which you won't need, so take it out. BINEX and EXBIN are worthless here, too, so pitch them. CMP is useful to see if files are identical, but also not worth keeping here. DCHECK and DEBUG can both go, and you can dump DUMP. LOGIN and TSMON are for use with an attached terminal intended for the multi-user mode, so take them both out; TEE can go, too.

Here is the easy way to clean house. Know that when deleting files from your data directory, you only need to specify the filename and not the whole pathlist. All the files listed here are in the CMDS directory. Therefore, make the CMDS directory the data directory by typing `CHD /D0/CMDS`. Now just a few typed lines will clean things up.

```
OS9>DEL ASM BINEX CMP DCHECK DEBUG DUMP
OS9>DEL LOGIN TEE TSMON
OS9>CHD /D0
```

After some OS-9 commands, a number of filenames may be entered up to the input buffer limit. The advantage of this is both reduced typing and speed since DEL is loaded only once to work on a number of entries.

Next we turn our attention to the DEFS files. These are only used with the assembler we just deleted, so we do the same with the DEFS files and their directory.

```
OS9>CHD /D0/DEFS
OS9>DEL OS9Defs RBFDefs SCFDefs SysType defsfile
OS9>DELDIR DEFS
```

At this point, OS-9 asks a cogent question to which I answer 'Y' and the directory goes away as well. Don't forget to do a CHD /D0 to return your data directory to D0.

Now we can copy *BASIC09* and *RUNB* to our commands directory. I suggest you type `LOAD COPY` to save a bit of time. Single drive copy works like single drive backup in terms of disk swapping and ready messages. The command lines should look like this:

```
OS9>COPY /D0/basic09 /D0/CMDS/basic09 -s #30K
OS9>COPY /D0/runb /D0/CMDS/runb -s #30K
```

The "-s" tells OS-9 you want a single drive copy and "#30K" allocates 30K bytes of memory buffer for the job. The larger the memory buffer, the fewer times you need to swap disks.

Now our CMDS directory looks like this:

```
Directory of /dl/cmds    21:39:33
BASIC09     attr        backup
runb        build       cobbler
copy        date        del
deldir      dir         display
dsave       echo        edit
format      free        ident
link        list        load
makdir      mdir        merge
mfree       os9gen      printerr
procs       pwd         pxd
rename      save        setime
shell       sleep       tee
tmode       unlink      verify
xmode
```

And we still have some room on the disk, as FREE will show.

```
"COLOR COMPUTER DISK" created on: 85/11/17
Capacity: 630 sectors (1-sector clusters)
193 Free sectors, largest block 129 sectors
```

One last item to attend to is the start-up file.

```
TMODE .1 -UPC
XMODE /P BAUD=4 -UPC
PRINTERR
SETIME </TERM
LOAD BASIC09
EX BASIC09 #12K </TERM
```

TMODE .1 -UPC sets the terminal for upper- and lowercase. My experiments indicate this must be in all start-up files when lowercase is desired. It can be issued from the keyboard as well. Lowercase is used in BASIC09.

XMODE /P BAUD=4 -UPC sets the printer output to 2400 Baud. Use '2' for 600 Baud and '3' for 1200 Baud. PRINTERR enables OS-9 to get error messages from the disk replacing numbers; it's nice to have. SETIME </TERM gets the date and time entries from the keyboard. Without </TERM, SETIME looks for input from the disk and the system locks up. This is an important point that some of us have learned through much suffering. A start-up file is set up to interact with the disk drive unless instructed otherwise.

We load *BASIC09* (the program) so we can go back and forth between OS-9 and BASIC09 (the language) without having to load *BASIC09* each time. Finally, *BASIC09* is executed using EX, which saves forming another shell. >/TERM must be included or BASIC09 looks for its input from disk.

At this point you have one disk that automatically boots into BASIC09 and has space for some program files. However, we have not optimized memory. On booting, OS-9 loads a standard set of modules. A few of these won't be used and can be tossed, making room for either larger program files in memory or providing space for other modules such as DIR, which you might want in memory. Elsewhere in this issue, Donald Dollberg discusses optimizing your OS-9 boot to tailor in-memory modules to just those you want. His article, "Creating OS-9 System Disks," starts on Page 224.

When you have finished customizing your BASIC09 working disk, keep it as a master disk and make backups for working disks. When you start a new programming project, it's a good idea to start with a new working disk, as well.

Next month, we will pop our completely customized BASIC09 disk in the drive and start programming.

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SDISK—Standard disk driver module allows the use of 35, 40, or 80 track double sided drives with COCO OS-9 plus you can read/write/format the OS-9 formats used by other OS-9 systems. **$29.95**

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All disk prices are for CoCo OS-9 format; for other formats, specify and add $2.00 each. Order prepaid or COD, VISA/MC accepted, add $1.50 S&H for software, $5.00 for CCRD; *actual* charges added for COD.

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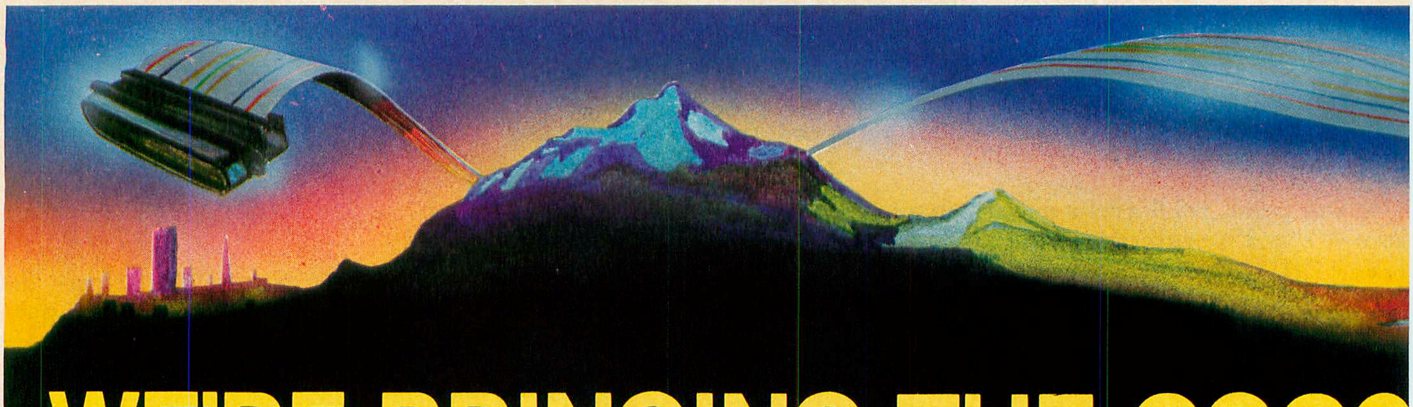

WE'RE BRINGING THE COCO

RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $20 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Fred Scerbo, Dan Downard, Ed Ellers, Lonnie Falk, Dick White, Tony DiStefano and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

To help you get started, a quick-reference command card is reproduced in this month's "Delphi Bureau" column. See Page 88.

FREE *LIFETIME* MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $29.95 value — and a free hour of connect time — a $6 value at either 300 or 1200 Baud during evening, holiday and weekend hours — so you can sample Delphi and the brand new RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $35.95 value as a ***free bonus!***

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SAVE EVEN MORE

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Problems? Call Delphi:

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DELPHI TYPE:

GROUP COCO

COMMUNITY TOGETHER!

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks, like Uninet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Uninet or Tymnet. Canadian residents using Datapac will be charged an additional $3 (U.S.) per hour.

On Uninet: Call (800) 821-5340 to get the Uninet number for your area. After you call the appropriate number for your own area and make connection, you'll see a prompt of "L?" Press ENTER, the period key (.) and ENTER again. At the "service:" prompt, type `GVC` (for General Videotex Corporation) and ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi will bill you an additional $3 (U.S.) per hour for Datapac connection surcharges.

From other countries: Many countries have their own data networks that can connect to either Uninet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 312561703088 through Uninet, or 310600601500 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `RAINBOWSUB` and press ENTER. At the "PASSWORD:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `RAINBOWORDER` and press ENTER. At the "PASSWORD:" prompt, type `SENDSUB` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just press `ENTER` and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to logon to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password. No time is assessed against your free hour of service while you answer these questions.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen user name and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**

KISSable OS-9

Granting Requests for Sample Device Drivers and Descriptors

By Dale L. Puckett
Rainbow Contributing Editor

We've received quite a few requests for sample device drivers and descriptors during the past year. This month, we deliver. Thanks to the generosity and talent of William R. Good in Harborcreek, Pennsylvania, we are featuring the source code for a device descriptor and device driver that turns *The Banker* from J & R Electronics (P.O. Box 2572, Columbia, MD 21045) into a nice OS-9 RAM disk. We'll also pass along information about two new OS-9 "shareware" entries and a terrific deal cooked up by one of our contributors.

Four Short C Programs

"I'm surprised that any good software ever gets to market," writes John Carter of Smyrna, Georgia. "Programmers always have one more idea and are always adding new features and improvements."

Carter knows what he's talking about. A few months ago he contributed a program called *cis.c*. Now, he's back with a new version named *cisnu.c* that's loaded with tutorial tips. In *cisnu.c*, Carter uses predefined strings and the "strncmp" function as he demonstrates how to use a library call that passes two string pointers and an integer value. He also uses a different check to determine which lines to delete from CompuServe's output. When you compile this one use the "-m=2K" option in your OS-9 command line. This will give *cisnu* the memory it needs to run.

We are also listing *noctl.c, printer.c, fox.c* and *wfox.c* from John Carter. Each is short and useful, but more importantly, these programs demonstrate several points. *Noctl.c* strips control characters out of a file. It is written as a filter, which means you can use it in an OS-9 pipeline or redirect the standard input path to it. It is similar to the BASIC09 program *newstrip* that I published more than a year ago. Here are two sample command lines:

```
OS9: list myfile ! noctl
OS9: noctl <myfile
```

Carter wrote *printer.c* to show a friend with an IBM PC how to send text to a printer from a C program. John's OS-9 version worked the first time. His friend's MS-DOS version still doesn't work. In John's words, "There's a lot to be said for a 'friendly' operating system, isn't there?"

By typing in and compiling the programs *fox.c* and *wfox.c*, you can observe the differences between the printf and write calls in C. We'll give you a hint, though. The program that uses write is much faster than the one that uses printf. The code is also much shorter. Have fun!

Incidentally, if you don't have a "time" utility command, you can make one with an OS-9 Shell script of the following format:

```
load date program.one program.two
  program.three
date t
program.one
date t
program.two
date t
program.three
date t
```

Type this procedure in a file named *timeit* or anything else you like. John also suggested I pass along a warning about a possible source of memory fragmentation you might not suspect. The problem and the solution can both be found by noting how OS-9 uses memory when you send output to — or read input from — a device. Here's the problem: OS-9 device drivers *do not* take their page of memory until they are called.

Suppose you boot OS-9 and imme-

(Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.)*

diately load the device descriptor for your printer, /p. By thinking ahead, you thought you were avoiding memory fragmentation. Not so. For example, if you load the device descriptor, load BASIC09 and redirect some output to your printer, you will find that you are left with fragmented memory after unlinking BASIC09. Fortunately, you will be able to get around the problem with the new version of OS-9. Version 2.00 has a special utility command named "iniz" that lets you initialize any device in your computer. In the meantime, you can get around the problem by typing the following command line immediately after you boot OS-9.

```
OS9: display 7 >/p  ENTER
```

A Device Driver for *The Banker*

We've mentioned from the beginning that one of the main reasons OS-9 is so popular with engineers is the fact that its modular design allows it to be adapted to all types of hardware. To connect a new piece of hardware to your OS-9 computer, you merely need to add a new device descriptor and device driver and plug in the hardware.

This month, William R. Good, of 7297 Belle Road, Harborcreek, PA 16421, offered to share his RAM disk drivers for *The Banker* from J & R Electronics. Hopefully, his efforts will help make you brave enough to attempt your own someday. And, if you're lucky enough to own *The Banker*, you'll be able to put his code to good use immediately. We've included the complete source listings of *bank.256k*, a device driver; *b.256k*, a device descriptor; and *install.256k*, the program used to install both the device descriptor and device driver each time your system is started.

The following start-up procedure file takes care of the operation automatically when you boot your system.

```
tmode .1 -pause
t
printerr
setime </term
chx /d1/CMDS
install.256k
format /b "RAM" < /term
free /b
dir /b
tmode .1 pause
```

We'll attempt to give you an overview of device drivers and device descriptors to go along with Good's nicely commented source code. First, device drivers are short pieces of 6809 code that are smart enough to know how to talk to a particular piece of hardware, a RAM disk for example. A device driver uses a device descriptor when it talks to your hardware. The driver itself is generic, meaning it can talk to any piece of hardware that uses the same chip.

The device descriptor does what its name implies — it describes each piece of hardware for the driver. For example, it gives the driver the absolute physical address of the device, the name of the file manager that will be sending data to it and the address of an initialization table that further describes the device. In Good's example, the device descriptor is named "/b" and the driver is named "bank." OS-9's RBF manager uses bank to read data from or write data to the device named /b.

Each device descriptor starts like any other OS-9 module — with a module header. The only special part of the header in this case is the type/language byte, which is $F0, a type set aside for

Hint . . .

Cassette Recorder Head Cleaning

Although there are a number of special cleaning cassettes on the market, the most effective way to clean tape heads is to use a cotton swab dipped in a head cleaner solution (denatured alcohol and Freon TF are two good choices). Unplug the recorder, press the Play button and wipe the faces of the heads with a side-to-side motion. Plug the recorder back in and hold another moistened swab against the rubber pinch roller to clean it completely.

— Ed Ellers

One-Liner Contest Winner. . .

This program lets CoCo users with two disk drives automatically back up a disk (either normal or OS-9 format) and see what's being copied during the process. If you have a Disk BASIC patch that allows use of 40 tracks (and two 40-track drives), you should change `FOR T=0 TO 34` to read `FOR T=0 TO 39`. (With a 40-track system, disks from Model III, Model 4 and double-density Model I systems can also be copied, but the copies may not be read properly by some Model I/III/4 DOS versions.)

The listing:

```
10 CLS:CLEAR 5000:INPUT"INSERT S
OURCE DISK IN #0, DEST. IN #1, H
IT enter WHEN READY";Z$:FOR T=0
TO 34:FOR S=1 TO 18:DSKI$0,T,S,A
$,B$:PRINT@0,"TRACK: ";T;"SECTOR
: ";S:PRINTA$;B$:DSKO$1,T,S,A$,B
$:NEXTS:NEXTT
```

Tony Doimeados
Darien, GA

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book Of Adventures* and its companion *The Second Rainbow Adventures Tape*.)

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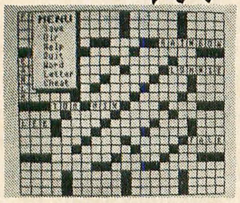

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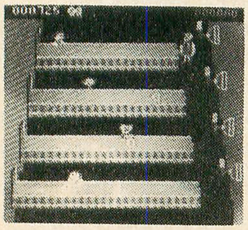

BREWMASTER

Move along the end of the bars serving beer to your thirsty customers. Watch for falling glasses and rowdy customers. Loads of fun.

REQUIRES 32K & JOYSTICK
TAPE $14.95
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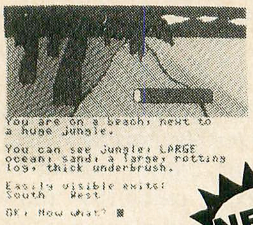


```
You are on a beach, next to
a huge jungle.

You can see Jungle, LARGE
ocean, sand, a large, rotting
log, thick underbrush.

Easily visible exits:
South   West

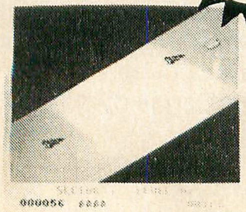
OK, Now what? ▒
```

BLACKBEARD'S ISLAND

A brand new high res graphic adventure. This one will blow your socks off! Wander around Blackbeard's Island being ever mindful of the hazards while your lust builds for Blackbeard's buried treasure. T'aint easy, matey!

REQUIRES 32K DISK ONLY
DISK $19.95

NEW!



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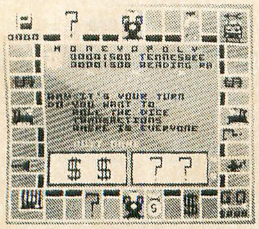
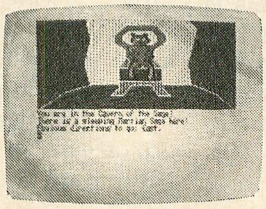


```
DAN, IT'S YOUR TURN
DO YOU WANT TO
   ROLL THE DICE
   TRANSACTIONS
   WHERE IS EVERYONE
```

MONEYOPOLY

Now! Play this popular board game on your computer. Probably the most realistic computer board game simulation ever. Contains all the features of the original. Buy, rent or sell properties and become a wealthy land baron with this program.

REQUIRES 32K & JOYSTICK
TAPE $19.95
DISK $22.95



```
You are in the Cavern of the Sage!
There is a sleeping Martian Sage here!
Obvious directions to go: East.
```

THE MARTIAN CRYPT

All new graphic adventure — Man discovers that life once existed on Mars. Can you find the hidden Martian Crypt? With sound effects to over 30 screens of animated high res graphics.

REQUIRES 32K MACHINE
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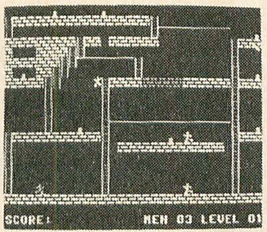

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Travel the maze, in your never ending search for **GOLD.** But be careful! There are hidden trap doors, burly guards, tricky ladders & slippery ropes. Sounds easy you say? Clear the 1st screen and 32 more await you!

REQUIRES 64K MACHINE
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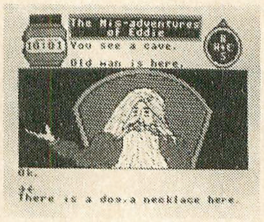
NEW!

THE MISADVENTURES OF EDDIE



```
You see a cave.
Old man is here.
OK.

There is a dog,a necklace here.
```

Another great graphic adventure!! This time you are exploring an old mine shaft when you stumble upon an old man — and into a different time! His rebellious son Eddie is roaming around time creating havoc and you must bring him home in order to return to your own time. Visit the apple orchard of Isaac Newton, the doomed Titanic — over 140 different locations and 50-plus commands! All in hi-res graphics. Only for the very adventurous and those who "enjoy being frustrated"!

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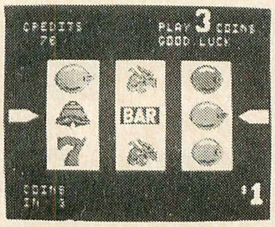
DISK $21.95



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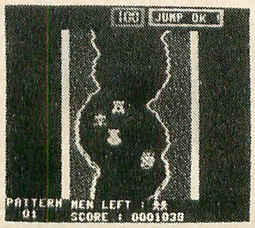
DISK $27.95



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device descriptors. The language is 01, for 6809 object code.

Following the module header you'll find the offset from the beginning of the module to the name of the file manager that uses the device. Next is the offset from the start of the module to the name of the device driver. Then comes the mode byte, which determines the file access mode of the device. Can you write to it or just read from it? After the mode byte you'll find the initialization table, which starts with a byte that contains the length of the table. Entries in the table define things like the type of device, the drive number, the step rate of the drives and the density of the media.

> ***"Device driver modules hold a package of subroutines that take care of input and output operations to a specific type of hardware."***

Device driver modules hold a package of subroutines that take care of input and output operations to a specific type of hardware. They also use a standard module header with a device type byte of $E0. Device drivers differ from standard OS-9 programs. In a standard OS-9 program, the execution offset address in the module header points to the beginning of the code that

Editor's Note: Although OS-9 and C programs are not included on RAINBOW ON TAPE, the following program listings are now available for downloading from our new Delphi CoCo SIG (there is a $3.50 per program surcharge). From the CoCo SIG> prompt, pick DATABASE and then, RAINBOW ON TAPE to access these programs.

Listing 1: *b*-OS-9 System Symbol Definitions

```
          ************************************************************
          * source name : b.256k rev 1.03                            *
          * Device descriptor for 194k ram disk                      *
          * This descriptor is for the banker board                  *
          *                                                          *
          * look in the listing for mod for 512k banker board        *
          *                                                          *
          * for 512k change the following address                    *
          *                                                          *
          * $001b change fcb $02f7 to fcb $06eb                      *
          * $001d change fcb $02f7 to fcb $06eb                      *
          *                                                          *
          * if you have any sugestions or corections feel free       *
          * to contact me by phone or mail (sase only)               *
          *                                                          *
          * William R. Good       Sept 1985                          *
          * 7297 Belle Road                                          *
          * Harborcreek Pa. 16421                                    *
          * 814-899-1953                                             *
          * released to public domain for educational use only       *
          *                                                          *
          * must me loaded after driver bank.256k best to be         *
          * as low as you can get it .use install.256k to have       *
          * the driver and descriptor loaded as low as possible      *
          * in memory                                                *
          ************************************************************
                                   nam    b
                                   ifpl
                                   endc
                                   ttl    Device descriptor for "b"
          ************************************************************
          * module header                                            *
          ************************************************************
0000 87CD002C                      mod    bend,bname,devic+objct,reent+2,bmgr,bdrv
000D FF                            fcb    $ff         mode byte
000E FFFF                          fdb    $ffff       device controller absolute
0010 FF                            fcb    $ff         phisical adress (cont.)
0011 0F                            fcb    bname-*-1   option byte count
          ************************************************************
          * Initalization tabels                                     *
          ************************************************************
0012 01                            fcb    $01         device type 1=rbf
0013 00                            fcb    $00         drive number
0014 03                            fcb    $03         step rate
0015 40                            fcb    $40         device type
0016 01                            fcb    $01         media density 1=double
```

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makes the program work. Not so in a device driver.

In a device driver, the execution offset address points to a branch table with a minimum of six three-byte entries. Each of these entries is usually a 6809 LBRA instruction to a subroutine that performs the appropriate task. A standard table in a typical OS-9 device driver used by the RBF file manager would include these routines at the following offsets:

Offset	**Name**	**Description**
0	INIT	Routine to initialize device
3	READ	Routine to read a sector from device
6	WRITE	Routine to write a sector to device
9	GETSTA	Routine to get status of device
$C	SETSTA	Routine to set status of device
$F	TERM	Routine to terminate the device

Good does not provide the GETSTA or SETSTA functions with his driver, so calls to them simply return to the RBF file manager without doing anything. We'll look now at what the random block manager (RBF) does when it makes a call to each subroutine in the driver. Hopefully, this will help you understand what needs to be handled when writing your own subroutines.

When RBF calls the INIT routine in your driver, it passes the address of the device descriptor it is using in 6809's Register Y. Register U has the address of the device's static storage area. The routine initializes the device's permanent storage and the control registers in the device itself.

The READ subroutine expects 6809's Register B to contain the most significant byte of the logical sector number in the file; Register X to contain the lowest significant bytes of the logical sector number; Register Y to contain the address of the path descriptor; and Register U to contain the address of the device's static storage area. The subroutine should read a sector from the disk and place it in the sector buffer. To do this, it must get the sector buffer address from PD.BUF and the drive number from PD.DRV in the path descriptor, compute the actual physical disk address from the logical sector number, then carry out the READ operation. During a READ operation 256 bytes are moved from the proper sector on the disk to the sector buffer.

The WRITE subroutine expects the 6809's registers to be set up the same way. In fact, it must also get the same information from the path descriptor and compute the physical disk address just like the READ routine. However, WRITE takes 256 bytes from the sector buffer and writes them to the disk.

The TERM subroutine is called with the 6809's Register U set to the address of the device's static storage area. It is called when the device is no longer needed. When called, it waits until all present I/O is finished, disables the device interrupts, removes the device from the IRQ polling list and returns any memory used to verify disk writes.

The *install.256k* program is needed to load the device descriptor, /b, and device driver, bank, into memory because of the way the hardware works in *The Banker.* It fills up the entire OS-9 memory space, except the lowest page, by manipulating the system's memory map and then loads the driver and descriptor. This forces them to the bottom page of memory where they can be available all the time. After *install* loads /b and bank, it releases the rest of the memory to OS-9.

If you assemble the device descriptor as Good wrote it you will wind up with a 194K RAM disk. You may, however, want to operate with either 35 or 40 tracks so OS-9's fast Backup command can be used to get your programs and data into your RAM disk. To do this, use the following script with the OS-9 Debug utility command.

For 35 tracks	**For 40 tracks**
l b	l b
. <SPACE> .+1b	. <SPACE> .+1b
=02	=02
=76	=d0
=02	=02
=76	=d0
q	q

To use these scripts, store them in a file and use a Debug command line like this:

```
OS9: debug <track.change.script
ENTER
```

If you want to make the changes permanent, you must save it, use the

```
0017 0001                fdb   $0001    number of cylinders(tracks)
0019 01                  fcb   $01      number of sides
001A 01                  fcb   $01      0=verify disk writes
001B 02F7                fdb   $02f7    default # of sect @ track
001D 02F7                fdb   $02f7    default # of sect @ track
001F 01                  fcb   $01      sector interleave factor
0020 01                  fcb   $01      min size of segment allocation
0021 E2         bname    fcs   "b"
0022 7262E6     bmgr     fcs   "rbf"
0025 62616EEB   bdrv     fcs   "bank"
0029 9F9C72              emod
002C            bend     equ   *
                         end
```

Listing 2: *bank.256k*-OS-9 System Symbol Definitions

```
*****************************************************************
* source name : bank.256k rev 1.03                              *
* Device driver for a 193k ram disk                             *
* This driver is for the 256k banker board                      *
* from :                                                        *
* J & R Electronics                                             *
* P. O. Box 2572                                                *
* Columbia, Md. 21045                                           *
*                                                               *
* History                                                       *
*                                                               *
* rev 1.00 first position indepentent code                      *
* rev 1.01 moved term position and redid some comments.         *
* this breaks some of os9's rules                               *
* revl.02 fixed the broken rules . added a commented data       *
* area to help see how the data is stored and where.            *
* revl.03 shortened up the code some what did total rewrite     *
* of most of the routines. used with install.256k               *
*                                                               *
* look in the listing for mod for 512k banker board             *
*                                                               *
* for 512k change the following address                         *
*                                                               *
* $0054 change lda #$03 to lda #$07                             *
*                                                               *
* William R. Good                                               *
* 7297 Belle Road                                               *
* Harborcreek, Pa. 16421                                        *
* 814-899-1953                                                  *
*                                                               *
```

verify command with the 'u' option to update the module's CRC and save it in a file named *b.256k*. It must have this name because that is the name of the file the program *install.256k* loads into memory.

The memory map printed with the source listings shows how *The Banker* is configured and how it works to help you understand what Good is doing in the device driver.

Bailey Improves *The Last Word*

I received a package from Mike Bailey at Unified Software. He had just finished a number of improvements to *The Last Word*, the mouse-driven word processor we described in the December issue. What did we see? First, the speed of the new *Word-Pak* version is very impressive.

Bailey had fine tuned his code and is now shipping *The Last Word* with the dictionary Lookup feature in both the Hi-Res and *Word-Pak* versions. He also gives you a *Config* file that the program reads on startup. *Config* gives you a way to tell the program where you want it to store its temporary files and where it can find the dictionary file. It also lets you initialize the tab settings and margins the way you want them during startup. And, there are also new "double-click" shortcuts, a la Macintosh, that make deleting a word or moving a sentence or paragraph easy and fast.

Additionally, since OS-9 Version 2.00 supports the use of the '@' key as an "alternate" key, Bailey is adding 10 user-definable function keys and a few other single key shortcuts. Mike tells me he is getting good feedback from his customers and that Tandy has approached him about selling *The Last Word* through their Express Order program. Congratulations, Mike!

A Start-up Tip from Brian Lantz

OS-9 Users Group President Brian Lantz stumbled upon an exciting trick while experimenting with some new Tandy software recently. Remember the new Tandy policy? All Color Computer software released by them during the past three or four months and all Tandy software released in the future — with the exception of the ROM pak cartridges — will run under OS-9.

Lantz was experimenting with a program called *Rocky's Boots* and studying the CMDS directory on the disk when he noticed something strange. There was a file in the CMDS directory — the standard execution directory — named *startup*. And to think we all thought "startup" was always a procedure file.

When Lantz looked a little closer he found the file contained only a few bytes of code. The programmer had reserved memory on the stack, pointed the 6809's Register X to the location of a string containing the name of the program, put the language and type code in Register A, initialized the rest of the 6809's registers and issued an OS-9 F$Chain system call. This short piece of code starts the application program when you type `DOS` at the Disk BASIC prompt. When you exit the program, a new Shell is born and you'll find an OS-9 prompt on your screen.

Now, here's the trick. When Lantz saw what the programmer was doing, he decided to experiment. The result is a quick and dirty trick you can use to start your own favorite application program when booting OS-9.

Do you remember how OS-9 works? When you type an OS-9 command line, what happens? After the Shell interprets the words on your command line it looks for the program you named in OS-9's module directory. If it finds it, it links to the code in the module and executes it.

But, what happens if the program you named is not in memory? Where does it look next? First, it looks in the current execution directory, then, if it does not find a file with the name you typed, it looks in the current data directory. If it finds a file there, it assumes it contains a procedure file, or Shell script.

Normally, when OS-9 is booted, SysGo has set up the root directory of device /D0 as your current data directory. Hence, that's where the procedure file named *startup* is normally found. But — and here's Brian's trick — what happens if you name a file that contains executable code "startup" and store it in /D0/CMDS, the current execution directory when OS-9 boots? You guessed it! OS-9 executes that file. Thus, if you want OS-9 to come up in *DynaStar* when booting the system, you need only rename the *DynaStar* file, *DS*, to *Startup* and watch what happens. OS-9 runs *DynaStar* until you exit it. Then, upon exit, OS-9 starts a new Shell and you'll find yourself looking at the OS-9 command prompt. Slick! It's amazing how you learn something new everyday.

```
     * released to public domain for educational use  only.      *
     * Sept. 1985                                                *
     *                                                           *
     * if you have any sugestions or corections feel free to     *
     * contact me by phone or mail (sase only)                   *
     *                                                           *
     * 256k banker 3 banks of ram $0000(0) - $FDFF(65023)        *
     * $02f7(759) sectors 194304 bytes  $fd(253) sectors per bank*
     *                                                           *
     * 512k banker  7 banks of ram $0000(0)  - $FDFF(65023)      *
     * $06eb(1771) sectors 453376 bytes $fd(253) sectors per bank*
     *                                                           *
     * must be loaded in the lower 32k of memory.                *
     * use install.256k to do this. must be loaded before the    *
     * descriptor b                                              *
     *************************************************************
                         nam   bank.256k
                         ifpl
                         endc
                         ttl   Device driver for banker
     *************************************************************
     * Module header                                             *
     *************************************************************
0000 87CD00FF            mod   bankend,bankname,type,revs,start,size
000D FF                  fcb   $ff        mode byte
000E 62616EEB   bankname fcs   /bank/
00E1            type     set   drivr+objct
0081            revs     set   reent+1
0012 03                  fcb   $03        edition
     *************************************************************
FE00            hiwrite  equ   $fe00      adr. of himem write rout
FE09            hiread   equ   $fe09      adr. of himem read routi.
FFC0            bank0    equ   $ffc0      bank0 select address
0010            dm.tot   equ   drvbeg+dd.tot+1
     *************************************************************
     * data section                                              *
     *************************************************************
     *     Device Static Storage Offsets
     *
     * V.PAGE rmb 1 Port Extended Address
     * V.PORT rmb 2 Device 'Base' Port Address
     * V.LPRC rmb 1 Last Active Process ID
     * V.BUSY rmb 1 Active Process ID (0=UnBusy)
     * V.WAKE rmb 1 Active PD if Driver MUST Wake-up
     * V.USER equ . Driver Allocation Origin
     * V.NDRV rmb 1 Number of drives
```

Users Group Library now in Dragon OS-9 Format

I received a pleasant surprise one day at work when I answered the phone to hear, "I'm calling from London." The voice belonged to Lionel Peters, an active OS-9 Users Group member in the United Kingdom. Peters is a Dragon owner and wanted me to let everyone know that he and Robin Hamilton have converted most of the OS-9 Users Group library disks from the CoCo OS-9 format to the Dragon format. This could be a real blessing for Dragon owners who have had trouble finding OS-9 software to run on their machines. You may write him at 40 Berkeley Road, London NW9, United Kingdom. His phone number is (441) 204-7869. By the way, Peters loves the tree utility command from the Users Group Library and suggests that you will, also.

Two New Shareware Packages and One Terrific Deal

We promised last month to pass along some information about two new shareware products and a terrific deal. Stephen Goldberg, 695 Plainview Road, Bethpage, NY 11714, a regular contributor to this column, came up with the deal.

"As a CoCo OS-9 user, I feel much of the OS-9 software is priced too high for many CoCo owners to take full advantage of this fantastic operating system," he writes. "To help promote the use of OS-9 on the CoCo, I have obtained the permission of the original distributor of *Utilipak*, DSS Peripherals of Farmingdale, New York, to offer Version 2.0 of this utility package at one-fourth the original $99 price if ordered directly from me."

The price for *Utilipak* through Steve is now $1 per utility — $22 for all 22 — plus $3 for shipping and handling. Here is a list of these $1 utilities. Order from Goldberg at the address above.

ALARM	— an alarm clock
APPEND	— add text to end of a file
CODE	— ASCII code display
COUNT	— count characters, lines and words
CRYPT	— encode or decode a file for security
D	— unformatted directory with "wild cards"
DL	— enhanced delete utility
ERROR	— define error numbers
GREP	— get regular expression and print
HEAD	— separate out lines at start of a file
TAIL	— separate out ones at end of a file
LOWER	— convert to all lowercase
UPPER	— convert to all uppercase
MV	— move a file
PK	— pack a file to occupy less disk space
UP	— unpack a previously packed file
SORT	— ASCII sort for files, directories, etc.
TR	— transliterate characters and strings in files
VAL	— numerical value in decimal, Hex and binary
VNAME	— change volume name (disk name)
ZCOPY	— multiple file copy with standard input
ZLIST	— enhanced list utility

Goldberg said *Utilipak* includes a machine language transfer utility that lets CoCo owners with single drive systems install all 22 programs in their CMDS directory in a single pass, as well as a procedure file that multidrive owners can use.

> ***"All Color Computer software released by them during the past three or four months and all Tandy software released in the future — with the exception of the ROM pak cartridges — will run under OS-9."***

A Driver for Your Favorite Plotter

One of the most active BASIC09 authors around is William L. Brady, 1503-I Flanders Lane, Harwood, MD 20776, phone (301) 952-1761, CIS ID: 70126,267. His *HiTerm* terminal program has been popular on CompuServe's OS-9 SIG for more than a year. Now, Brady has released *M-XY*, a multi-XY plotter, multifile chart generation program as a freeware product.

```
           *  rmb 8 rmb 8 reserved
   D 0000                     rmb    DRVBEG      Beginning of drive tables
           * DD.TOT rmb 3 number of sectors
           * DD.TKS rmb 1 track size (in sectors)
           * DD.MAP rmb 2 number of bytes in the allocation bit map
           * DD.BIT rmb 2 number of sectors per bit (cluster size)
           * DD.DIR rmb 3 address (LSN) of the root directory
           * DD.OWN rmb 2 owner's user number
           * DD.ATT rmb 1 disk acess attributes
           * DD.DSK rmb 2 disk id
           * DD.FMT rmb 1 media format
           * DD.SPT rmb 2 number of sectors per track
           * DD.RES rmb 2 reserved for future use
           * rmb DD.SIZ Device descriptor, sector 0
           * V.TRAK rmb 2 Current track
           * V.BMB rmb 1 Bit-map use flag
           * V.FileHd rmb 2 open file list for this drive
           * V.DiskID rmb 2 Disk ID
           * V.BMapSz rmb 1 Bitmap Size
           * V.MapSct rmb 1 lowest reasonable bitmap sector
           * V.ResBit rmb 1 reserved bitmap sector (for compaction)
           *  rmb 7 reserved
   D 000F                     rmb    DRVMEM      end of drive table
   D 0035            wcode    rmb    7           start of hiwrite
   D 003C            jumpl    rmb    2           return address #1
   D 003E            rcode    rmb    2           start of hiread
   D 0040            patch    rmb    1           change std to ldd
   D 0041            rest     rmb    4           rest of read code
   D 0045            jump2    rmb    2           return address #2
   D 0012            himemlen equ    .-wcode     length of himem code

   D 0047            size     equ                data area memory size
           *************************************************************
           * Start of executiable  driver function vectors defined in  *
           * os9 techinal information manual                           *
           *************************************************************
   W 0013 16000F     start    lbra  init         initalize driver
   W 0016 16007E              lbra  read         read sector
   W 0019 160060              lbra  write        write sector
   W 001C 160045              lbra  term         (getsta)
   W 001F 160042              lbra  term         (setsta)
   W 0022 16003F              lbra  term         terminate device
           *************************************************************
           * init : initalize the device and its memory area           *
           *                                                           *
```

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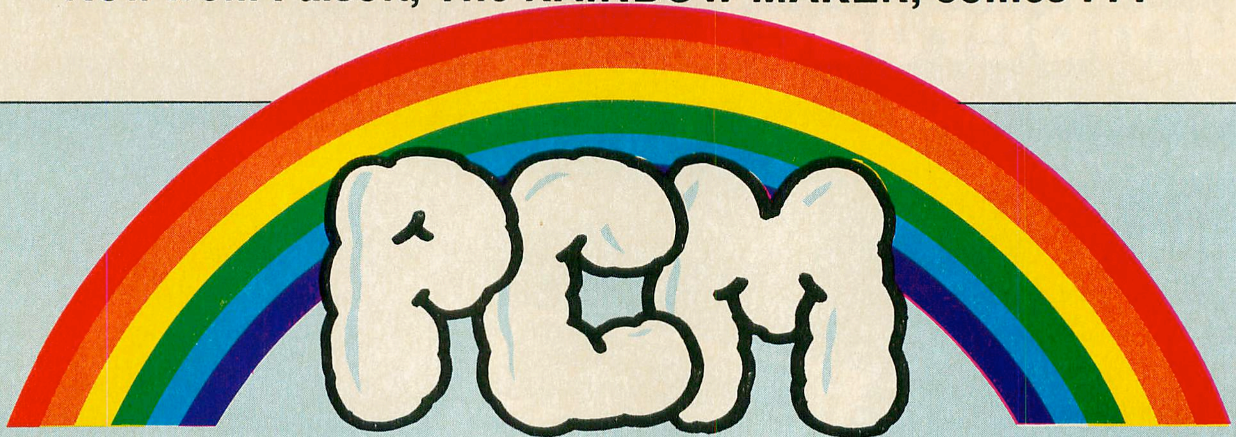

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Brady says *M-XY* is designed for serious OS-9 users who need applications software to drive a Pen-Type plotter. His package supports all Tandy plotters and may also be easily modified to drive Houston Instruments Machines and Hewlett Packard plotters. *M-XY* generates many types of charts from input files created by spreadsheets, databases, text editors or other applications software. It is written in BASIC09.

To run *M-XY* you need a 64K CoCo or other OS-9 computer, OS-9 and BASIC09 with *RUNB*. You can use the CGP-115, FBP-215 or Multipen plotter. If you're using the Multipen plotter, you'll also need the hardware RS-232 Pak or other ACIA-type port. This plotter requires two-way communications to work properly. You'll also need a screen that displays at least 51 columns by 16 lines. Brady recommends *Word-Pak* but says that both FHL's *O-Pak* and Computerware's *RS51* screens work just fine with *M-XY.*

M-XY is a perfect example of the power and speed of the BASIC09/OS-9 combination. It was developed on a 64K CoCo using standard OS-9 Level I, Version 1.01 and BASIC09. There is enough memory on a properly configured CoCo to run *M-XY* and *MIXY* under BASIC09 and still use DEBUG. Of course, you can save more memory if you use *RUNB*. Order from Brady at the address above. The price is $20 for a printed manual and a deluxe menu version plus at least one update. Be sure to specify if you are using *Word-Pak* or *O-Pak* and note the type you use, i.e., type=00 (standard) or type=80.

News about *PrintForm*

Also on the freeware or user-supported software front, we have news about *PrintForm*, a printer formatting program written by Frank N. Malaney, 8708 Mink St., SW, Pataskala, OH 43062. *PrintForm* gets around several of the shortcomings of the original *DynaForm* print formatter and gives the ability to send a predetermined series of control codes to your printer by inserting a two-character string in the text file. Written in Microware C, it is fast and relatively small at 12K. The required donation for *PrintForm* is $10. Remember, your donation to a freeware author compensates him by covering part of the cost of his time and materials.

PrintForm is a general purpose document printing formatter that takes the output file from an editor and produces a finished document. It assumes the text has been previously formatted into lines of the desired length and that each line is terminated with a carriage return. This means your editor must be able to organize the text into lines and paragraphs. *PrintForm* will not reorganize your text to combine lines or change the length of the lines.

Features of *PrintForm* include:

1) You can send complete Control Codes to your printer with a two-stroke entry in the text file.

2) You can define header and footer lines, which are printed automatically. And, you can include page numbers at any location on either line.

3) You have dynamic control over the left margin, header margin, footer margin and page length, as well as the header and footer location on the page.

4) You can call for conditional or non-conditional page breaks.

5) You can enter data into your document from the keyboard while it is being printed.

6) You may "next" a number of files so you can edit and print extremely long documents.

7) You may insert text — a name or address for example — from a separate file at the appropriate place in your master document using *PrintForm*'s mail merge capability.

8) You may print multiple copies of the same document without retyping the command line.

Malaney has given *PrintForm* the ability to use printer personality files. This makes it easy to configure the program to your printer and take advantage of all the capability built into your printer. This file makes it possible to send up to eight bytes of control codes to the printer by inserting only two keystrokes in your file. Up to 15 control code sequences may be defined and five of them can be set to toggle two different code sequences each time they are sent. This means you can both start and stop common printer functions, such as superscripts, subscripts, italics

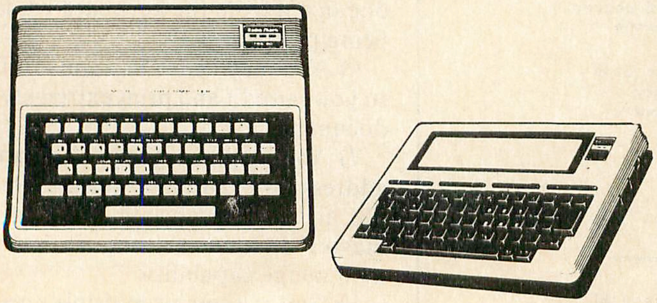
```
     * entry conditions :                                        *
     * u = start address of the device memory area               *
     * y = start address of the device descriptor                *
     *                                                           *
     * exit conditions :  none                                   *
     *                                                           *
     * if error : cc = c bit set  b = error code                 *
     *************************************************************
0025 86FF       init     lda   #$ff
0027 A74F                sta   15,u       allow read & write of sector
     *************************************************************
0029 C609       strcopy  ldb   #totlen    length of the code
002B 318D00C4            leay  wrutn,pcr  point to start of the code
002F 30C835              leax  wcode,u    point to device memory
     *************************************************************
     * strcode : store code in device memory
0032 A6A0       strcode  lda   ,y+        read one byte
0034 A709                sta   9,x        write one byte
0036 A780                sta   ,x+        write one byte
0038 5A                  decb             two bytes done
0039 26F7                bne   strcode    not done yet
     *************************************************************
     * fix the two jump's for hiwrite & hiread
003B 308D004C   fixit    leax  rtrn1,pcr  point to return address #1
003F AFC83C              stx   jump1,u    save it in jump1
0042 308D005E            leax  rtrn2,pcr  point to retrun address #2
0046 AFC845              stx   jump2,u    save it in jump2
0049 86EC                lda   #$ec       make it a ldd
004B A7C840              sta   patch,u    fix read routine
     *************************************************************
     * copy hiwrite & hiread to himem area of all banks
004E 31C835     cpyhimem leay  wcode,u    point to himem wr&rd routine
0051 CEFFC0              ldu   #bank0     bank0 page0 & page1
0054 8603                lda   #3         # of banks ( 3 or 7 )
0056 3422       copyhi   pshs  a,y        # of banks & adr of wcode
0058 1F30                tfr   u,d        bank select address
005A 5C                  incb             bump up bank select adr. by 1
005B 1F03                tfr   d,u        back in u where it was
005D 8D07                bsr   copybank   go write some code
005F 3522                puls  a,y        # of banks & adr of wcode
0061 4A                  deca             one bank done
0062 26F2                bne   copyhi     not done with all banks
     *************************************************************
     * term : terminate the device. This routine is called when  *
     * a device is no longer in use in the system (when the link *
     * count of its device descriptor module becomes zero).      *
     *                                                           *
     * entry conditions : u = address of the device memory area  *
     *                                                           *
```

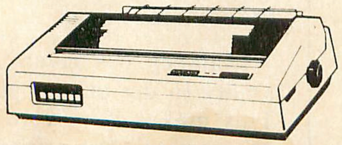
and underlining, with a single control-letter combination.

"I don't know your feeling on the concept of freeware, but if OS-9 is going to get moving, we have got to get more application-oriented software," Malaney said. "Benchmark programs and other system utilities are good and useful, but no one can justify buying an OS-9 machine to run them. We need a solid base of good useful application programs with adequate documentation for their use."

Agreed, Frank (see my December 1985 column)! Malaney is running an 80-track, double-sided drive as device, /D2. He said he wanted it as /D2 because of the incompatibility of the 80-track drive with many Disk BASIC disks. He modified many of his programs so they look for the programs on the proper drive using the dump utility to locate the references to the drive number, the debug utility to change them from a '0' to a '2' and the verify utility to update the CRC. Programs he modified include *Printerr, DynaSpell,* the *help* utility (from the OS-9 Users Group Software Exchange Library) and the Microware C Compiler.

```
       * exit conditions :  none                                   *
       *                                                           *
       * if error : cc = c bit set   b  = error code               *
       *************************************************************
  0064 5F         term     clrb             no errors
  0065 39                  rts              return to RBF
       *************************************************************
  0066 C612       copybank ldb   #himemlen  loop count
  0068 8EFE00              ldx   #hiwrite   start write address
       *************************************************************
       * writebnk : writes copy code on all ram banks for ram disk *
       *                                                           *
       * exit : b = loop count u = bank select address             *
       * x = address on ram bank where program is                  *
       * y = point to copy program in device memory                *
       *************************************************************
  006B 1A50       writebnk orcc  #$50       mask interupts
  006D A6A0                lda   ,y+        read 1 byte of code
  006F A548                bita  8,u        select bank
  0071 A780                sta   ,x+        write 1 byte of code
W 0073 B5FFC0              bita  bank0      bank0 page0 & page1
  0076 5A                  decb             one byte written
  0077 26F2                bne   writebnk   not done writing code
  0079 1C80                andcc #$80       done, reset interupts
  007B 39                  rts
       *************************************************************
       * write : writes a 256-byte sector buffer to the disk.      *
       *                                                           *
       * entry condition : u = address of the device memory area   *
       * y = address of the path descriptor                        *
       * b = MSB of the disk LSN x = LSB of the disk LSN           *
       *                                                           *
       * exit conditions : the sector buffer is written out to the *
       * disk                                                      *
       * if error :  cc = c bit set   b  = error code              *
       *************************************************************
  007C 3470       write    pshs  x,y,u
  007E 8D48                bsr   lsnck      check LSN
       *************************************************************
       * wrsect : writes a sector to the ramdisk                   *
       *                                                           *
       * d = data to write  b = loop count  y = points to PD.BUF   *
       * u = bank select  x = address of LSN(x) on ramdisk         *
```





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```
        *************************************************************
  0080 1A50       wrsect    orcc  #$50         mask interupts
  0082 3404                 pshs  b            save # of bytes done
  0084 ECA1                 ldd   ,y++         read two bytes from PD.BUF
  0086 A548                 bita  8,u          bank select
W 0088 7EFE00               jmp   hiwrite      jump to write routine
        *************************************************************
W 008B B5FFC0     rtrnl     bita  bank0        bank0 page0 & pagel
  008E 3504                 puls  b            get loop count
  0090 5A                   decb               one loop done
  0091 26ED                 bne   wrsect       not done writing sector
  0093 1C80                 andcc #$80         reset interupts
  0095 201D                 bra   exit         go back to RBF
        *************************************************************
        * read : reads a 256-byte sector from the disk and place it *
        * in the 256-byte buffer.                                   *
        *                                                           *
        * entry conditions : u = address of the device memory area  *
        * y = address of the path descriptor                        *
        * b = MSB of the disk LSN   x = LSB of the disk LSN         *
        *                                                           *
        * exit conditions : the sector is returned in the sector    *
        * buffer                                                    *
        *                                                           *
        * if error :  cc = c bit set  b  = error code               *
        *************************************************************
  0097 3470       read      pshs  x,y,u
  0099 8D2D                 bsr   lsnck        check LSN
        *************************************************************
        * rdsect : reads 256-bytes from ram disk to 256-byte buffer *
        *                                                           *
        * entry : d = data to read  b = loop count                  *
        * y = points to PD.BUF  x = address of LSN(x) on banker ram *
        *                                                           *
        * exit : sector read from ramdisk to sector buffer          *
        *************************************************************
  009B 1A50       rdsect    orcc  #$50         mask interupts
  009D 3404                 pshs  b            save # of bytes done
  009F A548                 bita  8,u          bank select
W 00A1 7EFE09               jmp   hiread       jump to read routine
        *************************************************************
W 00A4 B5FFC0     rtrn2     bita  bank0        bank0 page0 & pagel
  00A7 EDA1                 std   ,y++         write two bytes to PD.BUF
  00A9 3504                 puls  b            get # of bytes done
  00AB 5A                   decb               one loop done
  00AC 26ED                 bne   rdsect       not done reading sector
  00AE 1C80                 andcc #$80         done, reset interupts
        *************************************************************
  00B0 AEE4       cklns0    ldx   ,s           get LSN off stack
  00B2 2703                 beq   rdlsn0       LSN0 ?
        *************************************************************
  00B4 5F         exit      clrb                no errors
        *************************************************************
  00B5 35F0       return    puls  x,y,u,pc     restore stack, return
        *************************************************************
        * rdlsn0 : reads lsn0                                       *
        *************************************************************
  00B7 3570       rdlsn0    puls  x,y,u
  00B9 AE28                 ldx   PD.BUF,y     point to PD.BUF
  00BB 314F                 leay  drvbeg,u     point to DD.TOT
  00BD C614                 ldb   #DD.SIZ-1    # of bytes to copy
        *************************************************************
        * cdrvtl : copy drive table                                 *
        * copy first part of lsn0 (up to DD.SIZ) into drive table   *
        *************************************************************
  00BF A685       cdrvtl    lda   b,x          read a byte
  00C1 A7A5                 sta   b,y          write a byte
  00C3 5A                   decb               one byte copied
  00C4 2AF9                 bpl   cdrvtl       done writing ? no
  00C6 209C                 bra   term         yes
        *************************************************************
  00C8 ACC810     lsnck     cmpx  dm.tot,u     LSN > dm.tot ?
  00CB 2F07                 ble   setup        no
  00CD 3262                 leas  2,s          yes kill return
  00CF 53                   comb               set carry
  00D0 C6F1                 ldb   #$f1         sector error
  00D2 20E1                 bra   return       go back to RBF
        *************************************************************
  00D4 5F         setup     clrb
        *************************************************************
        * ckbank : check to see what bank of ram disk to use        *
        *                                                           *
        * exit : x = LSN offset  b = bank #                         *
        *************************************************************
  00D5 5C         ckbank    incb               bank count
  00D6 8C00FD               cmpx  #$fd         check bank number
  00D9 2506                 bcs   bank         done checking
  00DB 3089FF03             leax  -$fd,x       subtract $fd from x
  00DF 20F4                 bra   ckbank       check again
        *************************************************************
```

Hard Disk Interface Card from L.R. Technology

While fighting our way through the crowded aisles at RAINBOWfest-Princeton, we met Lloyd Barnett and Ron Schmidt of L.R. Technology, 2010 Grey Horse Drive, Warrington, PA 18976, phone (215) 343-0423. They were showing their new HDI hard disk interface. For $98, you get a card that lets you connect a hard disk controller like those from Xebec or Western Digital to your Color Computer.

The good news is that L.R. Technology supplies an OS-9 device descriptor, / H0, and a device drive, / Hdisk, for the card. The source code comes with the package. This is an interesting package for hardware hackers who like to roll their own, even though you can also buy complete five- ($550), 10- ($750) or 20- ($999) megabyte systems from L.R. Tech. The HDI gives a subset of the industry standard SCSI bus interface, data transfer rates up to five megabits per second, hardware support of up to eight hard disk controllers and interrupt capability. It works with all known buss extenders.

To build a complete system, you need an HDI, a 50-pin female ribbon cable three to five feet long, a hard disk controller (Xebec S1410A or equivalent), a 34-pin ribbon cable with two-card edge connectors, a 20-pin ribbon cable with one-card edge and one female connector, any hard disk with an ST506 interface and a power supply for the hard disk and controller. By the way, L.R. Tech also sells a Super Board that features dual serial ports, a parallel printer port and a real-time clock. The OS-9 device drivers that come with the package are interrupt driven and allow multitasking.

Don't Forget to Update OS9DEFS File

We were reading the mail on the OS-9 SIG recently and noticed several people were having the same problem assembling a new program. Since it turned out they all had the same problem — the programmer had used names from the OS9DEFS file that comes with Version 1.01 of OS-9 and the users were trying to assemble it using the OS-9DEFS file from Version 1.00 of OS-9 — perhaps a reminder is in order.

When you change versions of OS-9, make sure you also copy the new OS-9DEFS files onto the new system disk. By using the names defined in the files in the DEFS directory, you can ensure that the programs you write stay compatible with new versions of the operating system. But, you must assemble those programs using the write OS-9DEFS file.

Coming Next Month

In March we hope to make room for a C math library donated by a reader in Puerto Rico, two assembly language utilities, REP and UNLOAD, from Stephen Goldberg, and a sound generating program from Fred Swatelle. With a little bit of luck we'll take a close look at the growing library of *X* programs from Microtech. In the meantime, if you live in northern California be sure to catch the OS-9 breakfast at RAINBOWfest-Palo Alto, Feb. 16. Have a great Valentine's Day!

OS-9 Users Group News

At a recent OS-9 Users Group meeting, outgoing president Dale Puckett presented the gavel to the Group's newly elected president, Brian Lantz.

One of the exciting things that came out of the recent agreement between Falsoft and the OS-9 Users Group regarding the publication of the group's newsletter, *MOTD*, is increased cooperation in several additional areas. For example, Brian Lantz, the group's new president, hosted the very first Group CoCo conference on Delphi during October. Also, Lonnie has agreed to let the Users Group play a more important role during each RAINBOWfest: In addition to our BASIC09 and OS-9 seminars for beginners, Brian Lantz will join the roster of seminar speakers to present additional technical information and tips. And, the users group will most likely sponsor a booth in the exhibit hall.

But, here's the big news! The OS-9 Users Group will sponsor a breakfast Sunday morning at the Palo Alto RAINBOWfest (Feb. 16) for anyone interested in the OS-9 operating system. You need not be a member to attend. Lantz tells me he hopes to bring a popular speaker to each Users Group breakfast. During RAINBOWfest-Palo Alto, Paul Searby of Computerware will be the keynote speaker at the Users Group breakfast. Paul has been a staunch supporter of OS-9 for several years and has been responsible for the development and introduction of many new OS-9 products. I hope you'll show your support by joining him at the first OS-9 Users Group breakfast Sunday morning. ☐

```
           * bank                                                     *
           *                                                          *
           * entry : x = LSN offset  b = bank#                        *
           * exit  : d = LSN offset  u = bank select address          *
           ************************************************************
00E1 86FF        bank      lda    #$ff       MSB bank select
00E3 CBC0                  addb   #$c0       add offset
00E5 1F03                  tfr    d,u        put bank select in u
00E7 1F10                  tfr    x,d        LSN offset
           ************************************************************
           * dotfr : do transfer to ramdisk                           *
           *                                                          *
           * entry : d = LSN offset    u = bank select address        *
           *                                                          *
           * exit : b = 128                       y = pointing to PD.BUF *
           * x =address of LSN(x) on banker ram                       *
           * u = bank select address                                  *
           ************************************************************
00E9 1E89        dotfr     exg    a,b        LSN offset into memory adr.
00EB 1F01                  tfr    d,x        adr. of LSN(x) in banker ram
00ED C680                  ldb    #$80       # of bytes/2 to read or write
00EF 10AE28                ldy    PD.BUF,y   point to PD.BUF
00F2 39                    rts               back to read or write
           ************************************************************
           * write routine writen on the top page of all ram banks    *
           * org $fe00                                                *
           ************************************************************
00F3 A5C4        wrutn     bita   ,u         select bank
00F5 ED81                  std    ,x++       write two bytes
00F7 A548                  bita   8,u        select bank
00F9 7E                    fcb    $7e        op code for jmp
00FA 0000        jpl       fdb    0          jump address
0009             totlen    equ    *-wrutn
           ************************************************************
00FC A8EF94                emod
00FF             bankend   equ    *
                           end
```

Listing 3: *install.256k*-OS-9 System Symbol Definitions

```
            ***********************************************************
            * source name : install.256k rev 1.03                     *
            * program to install bank.256k and b.256k into low memory*
            *                                                         *
            * released to public domain for educational use only      *
            * Sept 1985                                               *
            *                                                         *
            * William R. Good                                         *
            * 7297 Belle Road                                         *
            * Harborcreek Pa. 16421                                   *
            * 814-899-1953                                            *
            *                                                         *
            * if you have any suggestions or comments please          *
            * feel free to contact me by phone or mail(sase).         *
            *                                                         *
            * makes the memory full except for three pages in low     *
            * memory then loads bank.256k and b.256k into memory then*
            * puts memory back the way you found it                   *
            *                                                         *
            * this should put the two programs as low as possible in *
            * anybody machine.                                        *
            ***********************************************************
                                 nam    install.256k
                                 ifpl
                                 endc
                                 ttl    installs ramdisk driver and descriptor
            ***********************************************************
            * Module header                                           *
            ***********************************************************
  0000 87CD00BB                  mod    instend,instname,type,revs,start,size
  000D 696E7374       instname fcs    /install/
  0011                type     set    prgrm+objct
  0081                revs     set    reent+1
  0014 03             edition  fcb    $03
            ***********************************************************
            * data section                                            *
            ***********************************************************
D 0000                bitnum1  rmb    2            starting bit #1
D 0002                bitnum2  rmb    2            starting bit #2
D 0004                bitcnt1  rmb    2            # of bits to clear
D 0006                bitcnt2  rmb    2            # of bits to clear
D 0008                chkbyte  rmb    1            test byte
D 0009                stack    rmb    200
D 00D1                size     equ                 data area memory size
            ***********************************************************
            * os9 f$schbit                                            *
            *                                                         *
            * function : searches the specified allocation bit map    *
            * for a free block (cleared bits) of the required length.*
            *                                                         *
```

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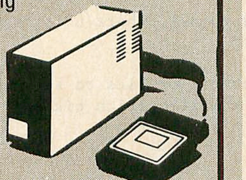

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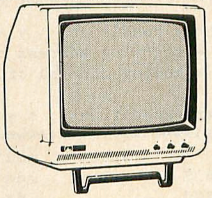

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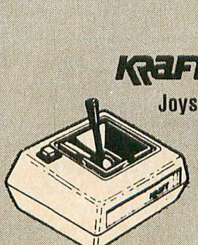

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```
     * the search starts at the starting bit number. if no    *
     * block of the specified size exists, the call returns   *
     * with the carry set, starting bit number, and size of   *
     * the largest block.                                     *
     *                                                        *
     * entry conditions : y = bit count (free bit block size) *
     * x = starting address of the map d = starting bit number*
     * u = ending address of the map                          *
     *                                                        *
     * exit conditions : d = starting bit number y = bit count*
     **********************************************************
0015            start    equ   *
0015 CC0000     schbit   ldd   #$0000    starting bit number
0018 8E0200              ldx   #$0200    starting address of the map
001B CE021F              ldu   #$021f    ending address of the map
001E 108E00FF            ldy   #$ff      bit count-free bit block size
0022 103F12              os9   f$schbit  do search
0025 2500                bcs   allbit    failed ?
     **********************************************************
     * os9 f$allbit                                           *
     *                                                        *
     * function : sets bits in the allocation bit map         *
     * specified by register x.                               *
     * bit numbers range from 0 to n-1, where n is the of bits*
     * in the allocation bit map.                             *
     *                                                        *
     * entry conditions : y = number of bits to set           *
     * x = starting address of the allocation bit map         *
     * d = number of the first bit to set                     *
     *                                                        *
     *                                                        *
     * exit conditions :  none                                *
     *                                                        *
     * if error : cc = c bit set  b = error code              *
     **********************************************************
0027 DD00       allbit   std   bitnum1   starting bit num#1
0029 1F20                tfr   y,d       this makes a
002B C003                subb  #$03      three page hole
002D 1F02                tfr   d,y       in low memory
002F DC00                ldd   bitnum1   get starting bit num#1
0031 CB03                addb  #$03      fix starting number
0033 109F04              sty   bitcnt1   save bit count#1
0036 DD00                std   bitnum1   save starting bit num#1
0038 8E0200              ldx   #$200     starting adr. of map
003B 103F13              os9   f$allbit
003E 2575                bcs   error
0040 2000                bra   cktop     check top 32k
     **********************************************************
     * cktop : check top memory                               *
     **********************************************************
0042 CC0080     cktop    ldd   #$0080    starting bit number
0045 8E0200              ldx   #$0200    starting address of the map
0048 CE021F              ldu   #$021f    ending address of the map
004B 108E007F            ldy   #$7f      bit count
004F 103F12              os9   f$schbit  do search
0052 2502                bcs   fixtop    failed ?
0054 200F                bra   fixit     no
     **********************************************************
     * fixtop : fix the top or memory                         *
     **********************************************************
0056 109F06     fixtop   sty   bitcnt2   save bit count
0059 DD02                std   bitnum2   save starting bit num#2
005B 8E0200              ldx   #$200     starting adr. of map
005E 103F13              os9   f$allbit
0061 2552                bcs   error
0063 2010                bra   load
     **********************************************************
     * fixit                                                  *
     **********************************************************
0065 8601       fixit    lda   #$01
0067 9708                sta   chkbyte   save check byte
0069 200A                bra   load
     **********************************************************
006B 62616E6B   loadrv   fcs   "bank.256k" filename
0074 0D                  fcb   $0d       end of line
0075 308DFFF2   load     leax  loadrv,pcr point to name
0079 8600                lda   #$0       language/type
     **********************************************************
     * os9 f$load                                             *
     * function : loads a modules from the file specified by  *
     * the pathlist or from the working execution directory   *
     * (if no pathlist is given)                              *
     *                                                        *
     * entry conditions :                                     *
     * x = address of the pathlist(filename)                  *
     * a = language/type code;0 = any language/type           *
     *                                                        *
     * exit conditions : u = address of the module header     *
     * x = address of the last byte of the pathlist(filenam   *
     * e) + 1  y = primary module entry point address         *
     * a = language/type code b = attributes/revision level   *
     *                                                        *
     * if error : cc = c bit set     b = error code           *
     **********************************************************
007B 103F01               os9   f$load
007E 2535                 bcs   error
0080 2007                 bra   load2        load next program
     **********************************************************
0082 622E3235   loadsc    fcs   "b.256k"     filename
0088 0D                   fcb   $0d          end of line
     **********************************************************
0089 308DFFF5   load2     leax  loadsc,pcr point to name
008D 8600                 lda   #$0          language/type
     **********************************************************
008F 103F01               os9   f$load
0092 2521                 bcs   error
     **********************************************************
     * f$delbit                                               *
     *                                                        *
     * function : clears bits in the allocation bit map       *
     * pointed to by register x                               *
     * bit numbers range from 0 to n-1, where n is the number *
     * of bits in the allocation bit map                      *
     *                                                        *
     * entry conditions : y = number of bits to clear         *
     * x = starting address of the allocation bit map         *
     * d = number of the first bit to clear                   *
     *                                                        *
     *                                                        *
     * exit conditions : none                                 *
     *                                                        *
     * if error :  cc = c bit set    b = error code           *
     **********************************************************
0094 9608                 lda   chkbyte      get check byte
0096 8101                 cmpa  #$001        is it $01
0098 2602                 bne   delbit       no, # of the 1st bit to clear
009A 200B                 bra   next         yes
009C DC02       delbit    ldd   bitnum2      first num to clear
009E 109E06               ldy   bitcnt2      get number of bits to clear
00A1 8E0200               ldx   #$200        get starting address of map
00A4 103F14               os9   f$delbit
00A7 DC00       next      ldd   bitnum1      next # of first bit to clear
00A9 109E04               ldy   bitcnt1      next # of bits to clear
00AC 8E0200               ldx   #$200        get starting address of map
00AF 103F14               os9   f$delbit
00B2 2501                 bcs   error
     ***********************************************************
00B4 5F         quit      clrb               no errors
00B5 103F06     error     os9   f$exit
00B8 2CB1BF               emod
00BB            instend   equ   *
                          end
```

```
                              MEMORY MAP
                             Banker Board

             BANK 0           BANK 1           BANK 2           BANK 3
$ffff    -------------------------------------------------------------------
        |  end of ram    |  end of ram    |  end of ram    |  end of ram    |
$fff0   |  $feff I/O     |  $feff         |  $feff         |  $feff         |
--------|****************|****************|****************|****************|
$ffef   |                | ram disk copy  | ram disk copy  | ram disk copy  |
        |      OS9       | program from   | program from   | program from   |
        |                | $fe00 - $fe12  | $fe00 - $fe12  | $fe00 - $fe12  |
PAGE 1  |                |****************|****************|****************|
        |                |                |                |                |
        |                |                |                |                |
        |                |                |                |                |
        |                |  select this   |  select this   |  select this   |
        |                |  32k bank      |  32k bank      |  32k bank      |
        |                |  bita $ffc9    |  bita $ffca    |  bita $ffcb    |
        |                |  also get      |  also get      |  also get      |
$8000   |                |  bank0 page0   |  bank0 page0   |  bank0 page0   |
--------*********************************************************************
$7fff   |                |                |                |                |
        |                |                |                |                |
        |                |                |                |                |
        |                |                |                |                |
        |                |                |                |                |
PAGE 0  |                |                |                |                |
        | driver must    |                |                |                |
        | be in this     |                |                |                |
        | page           |                |                |                |
        |                |                |                |                |
        | select this    | select this    | select this    | select this    |
        | 64k bank       | 64k bank       | 64k bank       | 64k bank       |
        | bita $ffc0     | bita $ffc1     | bita $ffc2     | bita $ffc3     |
        |                |                |                |                |
$0000   |                |                |                |                |
--------*********************************************************************
```

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Extended BASIC is NOT Required!	Yes	
"RAM DISC" extra text storage	Yes	
Loads in single load, does not occupy disk	Yes	
Menu-driven disk & cassette I/O	Yes	
Over 100 Support Function Keys	Yes	
Full Screen cursor control with auto repeat keys	Yes	
Compatible with ANY Printer	Yes	
Able to insert Control Codes	Yes	
5 separate printing modes	Yes	
Auto Double column printing	Yes	
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Each key depression produces a sound, so you just type	Yes	
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Displays underlined words on Screen	Yes	
True lower & upper case characters — true descenders	Yes	
Perfect margin justification	Yes	
Auto centering — page numbering	Yes	
NO hardware modifications needed	Yes	
Select lines per page — force new page	Yes	
Three (3) Search modes	Yes	
Recall accidental deletions	Yes	
Block copy & Block move	Yes	
Page forward & Backward in memory	Yes	
"Margin Offset" allows any number of letters pecified — artwork/text combined together.	Yes	
Complete 66 page manual included	Yes	
2). CONVENIENT TERMINAL PROGRAM		
Select Host or terminal mode	Yes	
Upload or Download Programs	Yes	
Talk mode, open/close buffer, auto open/auto close buffer	Yes	
Send control letters, block control codes	Yes	
Use buffer for complete editing	Yes	
Send contents of buffer to printer	Yes	
3). HELPFUL UTILITIES PROGRAM		
Load any program into buffer for examination or changes	Yes	
Edit or examine ANY high level language, such as BASIC	Yes	
Allowed to view ALL the Computer's memory	Yes	
Language function key to help make writing high level language easier	Yes	
"RAM TEST," a complete memory diagnostic program	Yes	

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Listing 4: *cisnu.c*

```
/* cisnu.c - revised version of cis.c */
/* last update 10-8-85 */
/* uses strncmp() and isdigit() */
#include <stdio.h>
#include <ctype.h>
static char TO[]="To: ";
static char UA[]="(UA RE T)";
static char REP[]="* Repl";
static char CHO[]="Enter choice";
static char CMD[]="Enter command";
static char RR[]="* RR ";
static char SPC[]="        ";
static char SSPC[]="    ";
static char MES[]="Message number (0";
static char PND[]="#: ";

main()
{
 int c, j, i, k;
 char lin[256];

 for(i=0;i<256;i++)
   lin[i]='\0';
 i=j=0;
 while((c=getchar()) != EOF) {
  if(c != '\f')
   lin[i++]=c & 127;
  if(c == 10 || c == 13) {
   lin[i] = '\0';
   lin[--i] = '\n';
   if(strncmp(lin,TO,4) == 0)
    j++;
   if(strncmp(lin,RR,5) == 0)
    j++;
   if(strncmp(lin,CMD,13) == 0)
    j++;
   if(strncmp(lin,CHO,12) == 0)
    j++;
   if(strncmp(lin,UA,9) == 0)
    j++;
   if(strncmp(lin,REP,6) == 0)
    j++;
   if(strncmp(lin,MES,17) == 0)
    j++;
   if((strncmp(lin,SSPC,4) == 0) && (lin[4] == '\n'))
   j++;
   if((strncmp(lin,SPC,8) == 0) && isdigit(lin[8]))
    j++;
   if(j == 0 && lin[0] != '\n') {
     printf("%s",lin);
     i=0;
     j=0;
   }
   else
    {
     j=0;
     i=0;
    }
  }
 }
```

Listing 5: *noctl.c*

```
 include <stdio.h>

main()
{
  int c, i;

  i= -1;
  while((c=getchar()) != EOF) {
    i++;
    if(i == 79) {
      putchar('\n');
      i=0;
    }
    if(c > 31 && c < 128)
      putchar(c);
    if(c == 10 || c == 13) {
      putchar('\n');
      i=0;
    }
  }
}
```

Listing 6: *printer.c*

```
#include <stdio.h>

main()
{
 FILE *lst, *fopen();
 if((lst=fopen("/p","w")) == NULL) {
   fprintf(stderr,"cannot open list device\n");
   exit(1);
   }
   fprintf(lst,"Test line\n");
   fclose(lst);
}
```

Listing 7: *fox.c*

```
/*      #(@)    fox.c 1.0       05-22-85        jec             */
/*      generates lines of text for terminal/printer testing    */
#include <stdio.h>

main(argc,argv)
int argc;
char *argv[];

{
        double atof();
        double i;
        long x;
        pflinit();

        switch (argc) {
                case 1:
                        i = 1000000;
                        break;
                case 2:
                        i = atof(argv[1]);
                        break;
                default:
                        printf("usage: %s [number_of_lines]\n",argv[0]);
                        exit(1);

         for( x = 1; x <= i; x++ )
                printf("\007abcdefghijklmnopqrstuvwxyz!@#$%^&*()ABCDEFGHIJKLMNOPQRSTUVWXYZ123456
789%71d\n",x);

         exit(0);
}
```

Listing 8: *wfox.c*

```
/*      #(@)    wfox.c 1.0      11-09-85        jec             */
/*      generates lines of text for terminal/printer testing    */
#include <stdio.h>

main(argc,argv)
int argc;
char *argv[];

{
        double atof();
        double i;
        long x;
        pflinit();

        switch (argc) {
                case 1:
                        i = 1000000;
                        break;
                case 2:
                        i = atof(argv[1]);
                        break;
                default:
                        write(1,"usage: wfox [number_of_lines]",29);
                        putchar('\n');
                        exit(1);
        }

        for( x = 1; x <= i; x++ ) {
                write(1,"abcdefghijklmnopqrstuvwxyz!@#$%^&*()ABCDEFGHIJKLMNOPQRSTUVWXYZ123456789
",71);
                putchar('\n');
        }

        exit(0);
}
```

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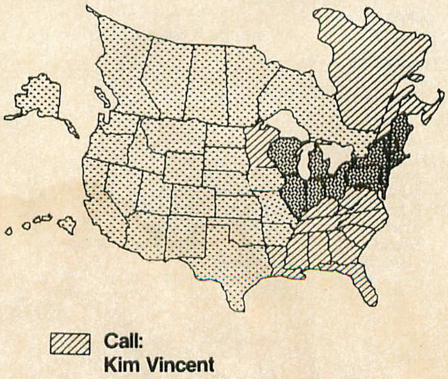

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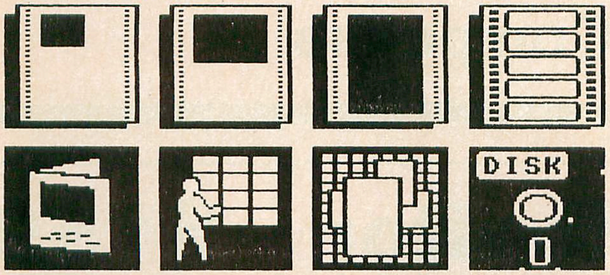

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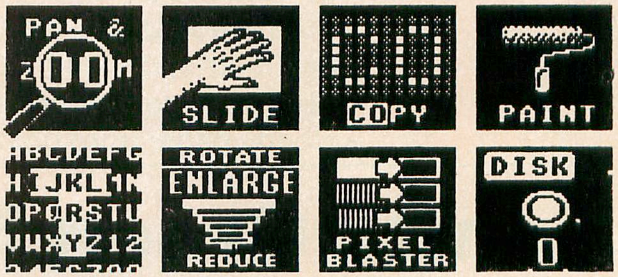

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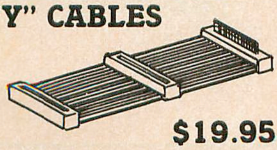

$19.95

GRAPHICOM $24.95

Catalog No. 111GD
Simply stated - One of the finest graphic programs written for the Color Computer!
FEATURES:

- S-U-P-E-R U-S-E-R F-R-I-E-N-D-L-Y !
- Supports 4 Hi-Res display modes
- 4 page animation mode
- Color Palette with over 15 color patterns for use with Hi-Res artifact
- Send/Receive pictures over modem
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games
- Multiple Hi-Res character fonts (user redefinable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
- SEND/RECEIVE slow-scan television
- Many additional features, operating hints, hardware mod's and suggestions, etc.

REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS

NEW MASTER KEY II

New Improved Version! A hardware product that takes control of any program regardless of protection. Now use with RS Multi-pak, "Y" cable or **optional** extender cable. Captures register contants as they were when Master Key II was engaged. Complete disassembler, memory save, and much more. Requires some familiarity with Assembly Language.
ROM PAK Cat. No. 160HR . . . . $ 99.95
Cat. No. 161HR With Ext. Cable . . . $109.95

PICTURE DISK SETS

Available from COMPUTIZE
4C - Artifact color palette
5C - Large character sets (from Derringer Software)
6C - Same as 5C but set up as stamp set
Picture Disk Set 1 . . . . $19.95
7 - Miscellaneous Art Set #1
8 - Miscellaneous Art Set #2
9 - Miscellaneous Ads and Examples
Picture Disk Set 2 . . . . $19.95
10 - Miscellaneous Fonts
11C - Artifact color palette type fonts
Picture Disk Set 3 . . . . $14.95
12C - Art demo from WHITESMITH
13C - GRAPHICOM PART II function demo
Picture Disk Set 4 . . . . $14.95

GC II FONT DISKS

Each disk contains 10 or more fonts. (4 versions of each font, one for each display mode).
14C - GCII Fonts Disk #1
15C - GCII Fonts Disk #2
16C - GCII Fonts Disk #3
GRAPHICOM PART II Font Disks . . . $19.95

TRIPLE TRANSFER UTILITY©

Transfer contents of disk to tape • Transfer contents of tape to disk • Automatically relocates cassette programs that conflict with the disk operating system • Displays machine language program addresses • Copies ASCII, Basic, & Machine Language Programs • All contained in 1 menu driven program!
REQUIRES 32K CC EXT.
Cassette $19.95 . . Cat. No. 105CT
Disk $24.95 . . . . Cat. No. 105CD

SUPER BACK-UP UTILITY©

. . .WITH S.B.U. FROM COMPUTIZE — YOU'LL NEVER NEED ANOTHER BACK-UP UTILITY FOR YOUR COCO!!!
SUPER BACK-UP UTILITY WILL PERFORM **ALL** OF THE FOLLOWING FUNCTIONS:

1. **TAPE TO TAPE** (Regardless of most protection schemes!)
2. **TAPE TO DISK** (Move Cassette programs to Disk!)
3. **AUTO RELOCATE** (For those Cassette programs that conflict with Disk operating systems.)
4. **DISK TO TAPE** (Place Disk programs onto Cassette)
5. **DISK TO DISK** (Our powerful Split-N-Image Program, Copies regardless of protection schemes!)

- **MENU DRIVEN**
- **REQUIRES 32K EXTENDED COCO**
- **REQUIRES 1 OR 2 DRIVES**
- **ALL MACHINE LANGUAGE!!!**

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DISK $49.95 . . . . Cat. No. 107CD

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There is no need to suffer the heartbreak of crashed disks any longer. Spit-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions. Will also initialize and back-up in one pass. Data processing experts always insist on having a back-up — it's good a practice.
REQUIRES 32K CC
DISK $34.95 . . . . Cat. No. 101CD

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PA residents
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Howard Medical Computers

Zenith 130 Color Monitor $159

Was $39
($14 shipping

- Medium resolution 2.5 MHz 240 x 200 dots
- Same as 131 except No RGB
- With 90 day Zenith warranty
- **Monitors require video controller See page 34**

NEW 40 COLUMN

Howard-80 Printer $128.5

($5 shipping

- 80 column, serial interface, 12″x6″x3″
- Bidirectional dot matrix thermal printer
- 6x7 matrix, dot addressable graphics, 4800 dots per square inch
- Needs cable from color computer and Howard-80 $10

Portable NICAD Unit available for $179.95

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- 12″ Zenith 123A Green Screen is easy on the eyes
- High resolution: 640 dots x 200 dots, 15 MHz band width
- Composite video monochrome

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New! J&M Controller **JFD-CP with JDOS** $128

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($2 shipping

- Eliminates software compatibility problems
- Single switch lets you switch from J DOS to RS DOS
- Gold contacts & data separator
- New serial port so you don't need a serial interface for a parallel printer

RS DOS ROM $20/ea.

Reg. $4
($2 shipping

- ROM chip makes J&M compatible
- 24 pin fits both versions of J&M controller
- Release 1.1

Howard Medical Computers

Box 2, Chicago, IL 60690 (800) 443-1444 orders (312) 278-1440 question

Howard Medical offers a 30-day return guarantee on all hardware we sell. Return equipment to us within 30 days for refund if you are unsatisfied for any reason. Quantities limited and subject to availability.

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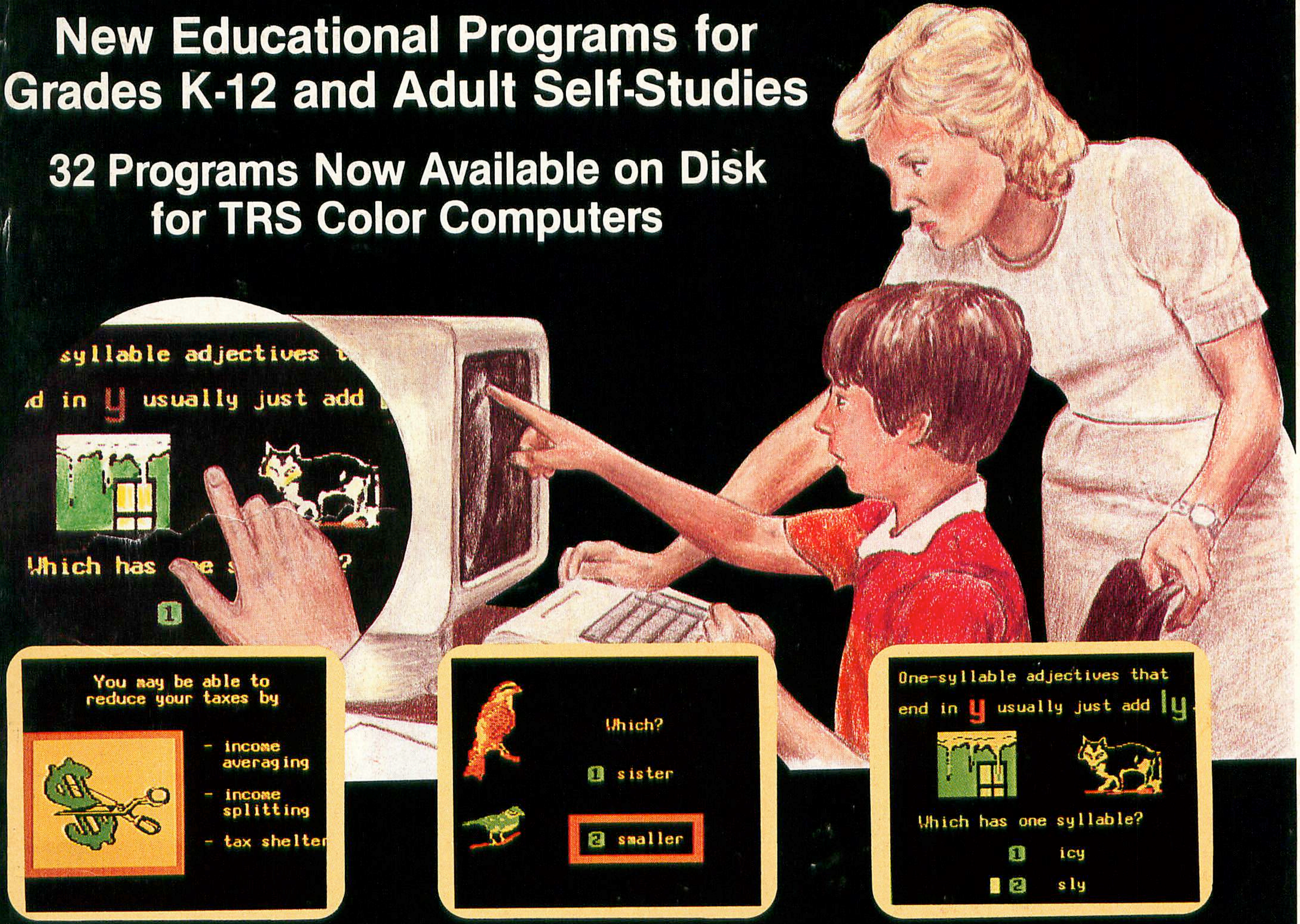
Apple - Atari - Commodore - TRS 80 I, III, 4 & Color - IBM PC Jr. - Tandy 1000

New Educational Programs for Grades K-12 and Adult Self-Studies

32 Programs Now Available on Disk for TRS Color Computers


syllable adjectives
d in y usually just add
Which has one s
1
You may be able to reduce your taxes by
- income averaging
- income splitting
- tax shelter
Which?
1 sister
2 smaller
One-syllable adjectives that end in y usually just add ly.
Which has one syllable?
1 icy
2 sly

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Over 1000 programs for your selection with 32 now available on disk for the Color Computer and 500 now available for the Tandy 1000.

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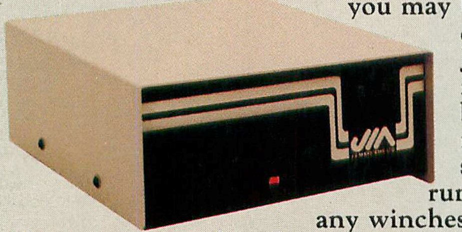
HEAT UP YOUR COCO!

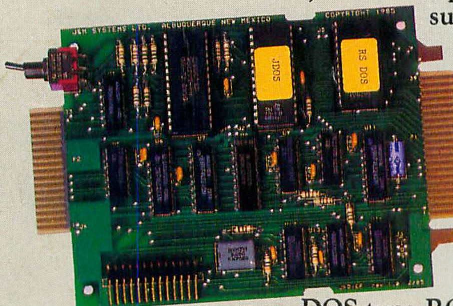
New *HARD DRIVES*



Besides the obvious advantage of increased disk access speeds and a vast amount of storage, our COCO hard drives boast many innovative features. For instance, you may boot OS/9 directly from JDOS - no intermediate boot floppy is required. Our software can run with virtually any winchester with a ST412 type interface. Our drives have capacities of 5, 10, or 20 MBytes (formatted), and may be either partitioned into up to 7 logical units or left as one large logical unit. Our COCO hard drive systems are complete with case, power supply, cables, OS/9 drivers, and instructions. Prerequisite: OS/9, JFD-CP controller.

5¼" 5 MByte full size	$495
5¼" 10 MByte ½ size	$650
3½" 20 MByte (shown above)	$795

JFD-CP DISK CONTROLLER



Our new JFD-CP, compatible with both the original COCO and the COCO 2, features a parallel port to support a Centronics compatible printer or our hard drive, and an external ROM switch, which allows you to select JDOS or an optional RS DOS-type ROM. It comes in a case and includes JDOS 1.2 and manual. JDOS implements all RS DOS commands, plus many more, including auto line numbering, error trapping, baud rate selection, OS/9* boot from floppy or hard drive, and Memory Minder**, our disk drive analysis program (Precision Alignment Disk not included).

JFD-CP Disk Controller with JDOS	$139

COCO-CLASSIC

Our old JFD-COCO controller remains a strong seller. Some people just like old "classics" best! So we have brought it back at the lowest price ever!

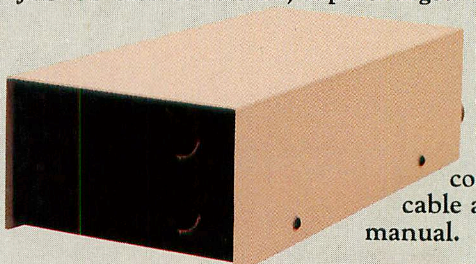
JFD-COCO Disk Controller with JDOS	$99

New *TERMS*

One-year warranty on parts & labor; 30-day money back guarantee (except shipping) if not totally satisfied. Items must be returned in like new condition.

Free shipping via UPS in continental United States for payment by VISA, MasterCard, or cashiers check. COD requires 10% prepayment by bank card plus 3% shipping. Blue Label and foreign shipping extra.

DRIVE SYSTEMS



Upgrade your Color Computer by adding our new JFD-CP disk controller, supercharged with JDOS 1.2 operating system, and a top quality drive with case and power supply. Comes complete with cable and JDOS manual.

Drive 0 System with one single side drive	$279
Drive 0 System with one double side drive	$349
Drive 0,1 System with two single side drives	$389
Drive 0,1 System with two double side drives	$489

*MEMORY MINDER***

memory minder
A DISK DRIVE ANALYZER
Dysan
DDD

Memory Minder is a disk drive test program now included in JDOS. Used with a Precision Alignment Disk, Memory Minder allows you to check your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align or adjust the drives while viewing the graphics on the screen. No special equipment needed!

PRECISION ALIGNMENT DISKS (From Dysan)	
PAD-40X1: Tests single side disk drives	$26
PAD-40X2: Tests double/single disk drives	$33

Memory Minder is available on diskette for those who don't own a JFD-CP controller with JDOS. Includes Precision Alignment disk.

Memory Minder: single side package	$59
Memory Minder: single/double side package	$75

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